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National Retail Dry Goods Association

Arithmetic for executive training groups...

New York

[1934]

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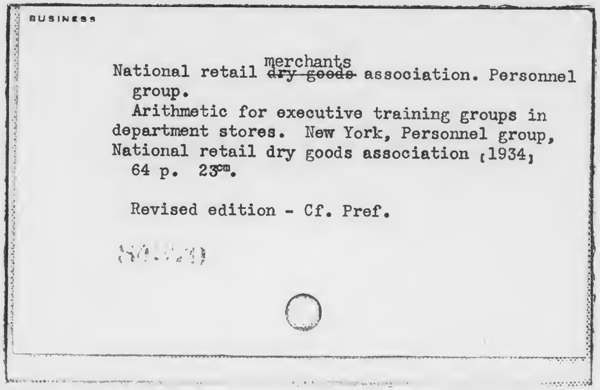

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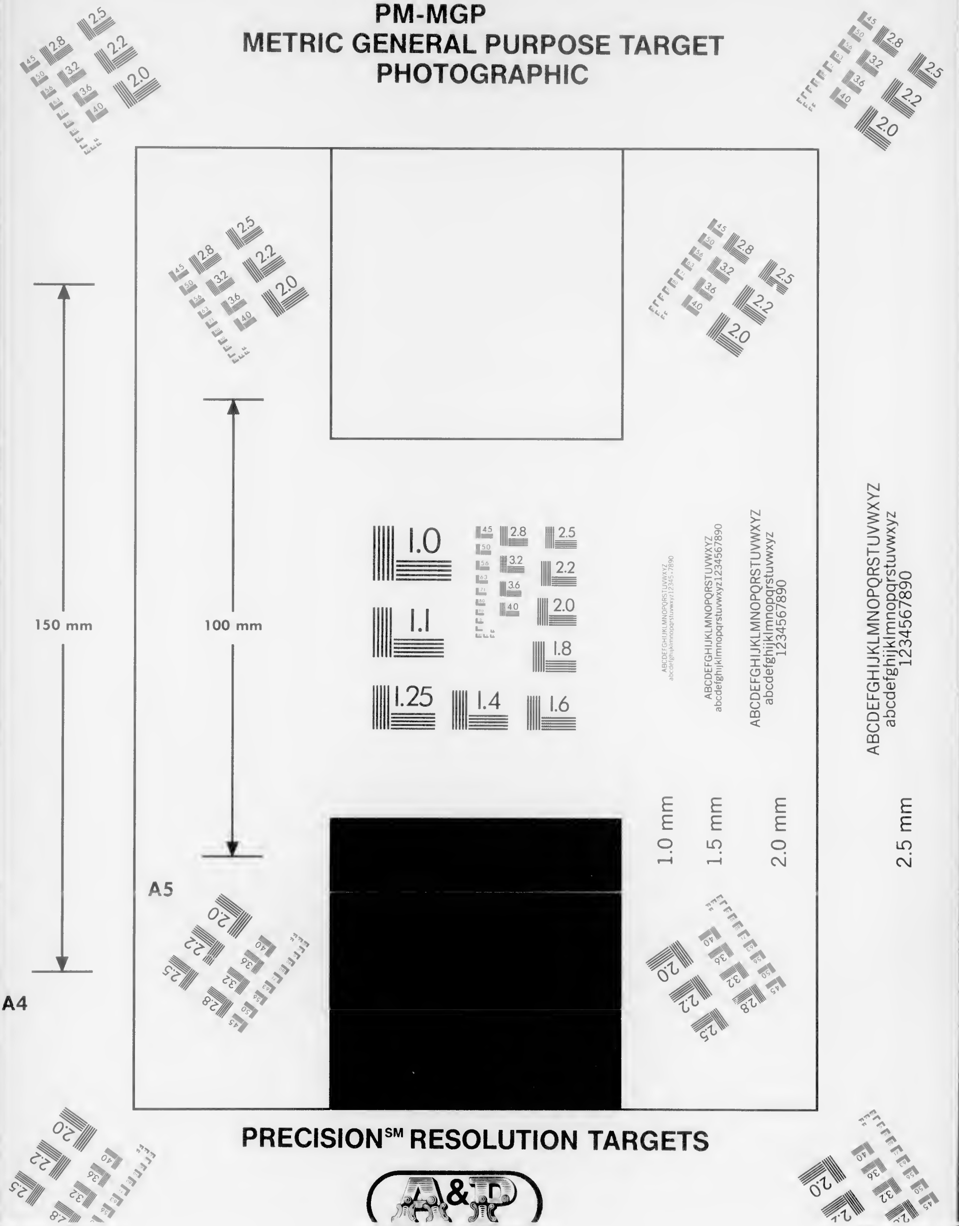
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In Department Stores

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FOREWORD

In presenting this revised edition of "Arithmetic for Executive Training Groups in Department Stores," the Personnel Group wishes to make public acknowledgment first, of the generosity of the Prince School of Store Service Education in permitting the publication of this valuable text, and second, of the Group's indebtedness to the author, Miss Irene M. Chambers of the Prince School staff, for her unselfish interest in making available to others the content of her excellent course and for her willingness to undertake the burdensome task of compilation.

The care and precision with which the manual was prepared have won for it wide recognition as a standard text in merchandising mathematics. It has been adopted by many colleges offering courses in retailing and is used by executive training classes in stores throughout the country.

The manual was first published in February, 1931. Its cordial reception necessitated a second printing a few months later. When that large edition was exhausted, a revision of the text seemed desirable before a third printing was undertaken. The Chapters on Profit and Loss, on Retail Method of Inventory, and on Stock Turnover have been revised only slightly. In the remaining chapters, the subject-matter of the original edition has been retained but the treatment has been altered materially to simplify further the work of the student.

It is believed that this new edition of the manual will be even more effective than the earlier version in making clear and understandable the mathematical processes in merchandising.

HELEN R. NORTON.

New York City,
May 20, 1934.

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CHAPTER I

VENDOR'S DISCOUNT

The term *Vendor* as here used, applies to that resource from which the retailer purchases merchandise for resale to the consumer. The vendor may be a manufacturer or a wholesaler. A *Discount* allowed by a vendor is a percentage of reduction from the price of the merchandise as listed on the invoice. An invoice is a vendor's statement of indebtedness, itemized to include each article, the quantity, and the price. The invoice is sent by the vendor to the retailer at the time the merchandise is shipped.

Types of discount are briefly distinguished in the outline which follows.

TYPES OF DISCOUNT

I. Cash discount
  1. Definition: a cash discount is a percentage of reduction that is offered to encourage prompt payment.
  2. Location of discount terms on the invoice; cash terms appear at the head of the invoice and do not affect the initial mark-up.
  3. Classification of cash discounts according to dating given in the terms:
    a. Terms by which the discount is available for payment within a stipulated number of days after date of invoice.
    b. Terms by which an extension of time, beyond the period first stipulated, is granted for availability of the cash discount; called *advance* or *post dating.*
      (1) End of month, abbreviated E. O. M.
      (2) Receipt of goods, abbreviated R. O. G.
      (a) Extra dating, characterized by "60 extra," or "90 extra."

II. Quantity discount
  1. Definition: a quantity discount is a percentage of reduction allowed for a purchase of or above a stipulated amount on a single order.
  2. Purpose: to increase the size of the individual order, thus tending to decrease production and distribution costs for the manufacturer and to decrease his style risks.

III. Period discount, cumulative quantity discount, or retroactive discount*
  1. Definition: a period discount is a percentage of reduction allowed for purchases of or above a stipulated dollar amount within a stated period of time.
  2. Purpose: to concentrate patronage of retailers upon fewer vendors, thus tending to increase vendors' volume and to decrease their production costs.

IV. Trade discount
  1. Definition: a trade discount is a percentage of reduction originally allowed by manufacturers to wholesalers and jobbers but now allowed to retailers on certain lines of goods quoted at catalogue prices.
  2. Purpose: to grant a fair trading allowance when prices quoted from catalogues or lists on certain lines of goods are not revised to meet all market changes or reductions.

*** Sometimes called rebate.**

A **Cash Discount** is a percentage of reduction that is offered to encourage prompt payment. Present so-called cash discounts are as high as 8% and 10% on certain lines of merchandise. A cash discount appears at the top of an invoice in the form of terms. It does not usually affect the initial mark-up of the buyer because he marks the merchandise up from the price listed on the invoice. The total amount of discount on an invoice is deducted from the cost of merchandise, but not from the individual items, and not at the time those items are being given their mark-up. An illustration of terms is, "2/10 net 30." The first numeral gives the discount rate. The second stipulates the number of days that the rate is available; thus, "2/10" means that 2% of the total amount of the invoice may be deducted if payment is made within 10 days. After 10 days, the full amount of the invoice is due. "Net 30" means that the invoice must be paid not later than 30 days from the date of the invoice; that it will be past due if not paid by that time, and that it may be subject to an interest charge.

Take as an illustration, an invoice totalling $500, dated November 10, with terms 2/10 net 30. This means that if the invoice is paid by November 20, $10. (2% of $500) may be deducted. The discounted bill will be $490. After November 20, the full amount of $500 will be due. "Net 30" means that $500 must be paid not later than December 10. After that date, it will be past due, and may be subject to an interest charge.

If terms allow more time than the date of the invoice and the time numeral (*10* in terms 2/10) in the terms would indicate, they are said to give *advance* or *post* dating. The two expressions are synonymous when used in this connection. The word, *advance* means that the date of payment is pushed forward into the future. The word, *post*, means that payment need not be made until after the time indicated by the date of the invoice.

End of Month dating means that the days for allowing discount are counted from the end of the month, and not from the date of the invoice. A further extension of time is usually granted if an invoice is dated on or after the twenty-fifth of a month. In such a case, E. O. M. is taken to mean the end of the following month. For example, if an invoice gives terms 8/10 E. O. M. and is dated March 26, the discount is available until ten days after the end of April, or until May 10. If that invoice had been dated March 16, the discount would have been available until April 10. If a store has accounts with many manufacturers who give E. O. M. dating, many of its accounts will be due for payment on the same date.

Receipt of Goods means that the days for allowing discount are counted from the date of receipt of goods, and not from the date of the invoice. When this form of dating is used, it is given by eastern vendors to far western retailers. If a Pacific Coast retailer were allowed only ten days from date of shipment, the payment would fall due, in some cases, before the merchandise was received. This would lead to dissatisfaction and call for adjustments. An illustration of R. O. G. dating follows:

Invoice for $840 dated May 6. Terms 8/10 R. O. G. Merchandise received May 14. When must payment be made to deduct the discount, and what will be the amount of payment?

Invoice $840.00
Less 8% 67.20
Payment ....$772.80 must be made May 24.

One eastern manufacturing industry has adopted the practice of allowing 15 days extra on shipments west of the Rockies. This form of dating differs in form from R. O. G., but is intended to meet the same situation.

Extra Dating means that the discount will be available for a specified number of days in addition to the number first stipulated in the terms. For instance, 2/10-60 extra means that 2% may be deducted, not only for 10 days, but for 60 extra, or for 70 days from date of invoice. An example follows:

Invoice for $960 dated August 11. Terms 3/10-60 extra. When must payment be made to deduct the discount and what will be the amount of payment?

Invoice $960.00
Less 3%....... 28.80
Payment.........$931.20 must be made 60 days after 10 days after August 11, or October 20.

Anticipation. This is not a form of agreement, but is a practice which must be understood in connection with the terms of an order. It is the practice of paying a bill before date due, and deducting from the bill, interest for the days of anticipation. A retailer who meets his obligations with this promptness and who can avail himself of this legitimate advantage, is in good standing with vendors. An illustration of anticipation follows:

Invoice for $670 dated April 4. Terms 2/10-90 extra.

Bill paid April 14. Compute the amount of payment, (a) with anticipation figured on billed amount; (b) with anticipation figured on net amount after 2% discount has been deducted.

A year is reckoned at 360 days. 90 days, therefore, is ¼ of a year. Interest is computed at 6% per annum. 6% for ¼ year is equal to 1.5%.

(a)	Invoice	$670.00
	Less (2% plus 1.5%) 3.5%	23.45
	Payment	$646.55
(b)	Invoice	$670.00
	Less 2%	13.40
	Bill less discount	$656.60
	Less 1.5% for anticipation	9.85
	Payment	$646.75

It will be observed that in this case there is a difference of 20 cents between the two methods of figuring. The vendor would prefer the latter method.

A **Trade Discount** is a reduction originally allowed by manufacturers to wholesalers and jobbers, but now allowed to retailers on certain lines of goods quoted at catalogue prices. Trade discounts are commonly quoted in a series, the amount of the discounts varying with the market prices at the time, and with the size of the order. If an invoice for $1,200 carries trade discounts, "less 25%, less 10%, less 5%," the computation will be as follows:

Invoice	$1,200.00
Less 25%	300.00
	$900.00
Less 10%	90.00
	$810.00
Less 5%	40.50
	$769.50

The preceding paragraphs do not name all possible varieties of terms. They define types of terms. Within these types different varieties of agreement may appear. To illustrate this variety, a few quotations from manufacturers' codes promulgated under the NRA in the summer and fall of 1933 are listed below:

"Not more than 8/10 E. O. M."

"A maximum cash discount of 5%, not to be allowed later than 30 days after delivery date specified on the order, or date of shipment, whichever is later, except that west of the Rocky Mountains the discount period is extended an additional 15 days."

"Standard terms are 2/10 E. O. M., or net 60. Invoices on and after the 25th considered as of the first of the following month. Maximum rate of anticipation, 6% per annum. The building up of prices to take care of greater discounts than 2% is prohibited. No secret rebates or discounts allowed."

"Maximum is 2/10-30 days extra."

"2/10-60 days extra, with the privilege of giving E. O. M. dating. Goods shipped on E. O. M. terms after the 25th may be dated the first of the following month."

"Maximum terms: for retailers and catalogue houses, the maximum terms are 8/10 E. O. M., or 6% 50 days after date of invoice, net 51. Shipments made on and after the 25th on E. O. M. terms may be dated the first of the following month. No trade discounts, rebates, or extra dating are allowed."

"Maximum terms permitted are 3/30, 2/60, 1/90, or net 91 days. An additional deduction may be allowed for cash payment within discounting periods for shipments made in September, 4%; in October, 3%; in November, 2%; in December, 1%. Cash discounts and deductions to apply for cash payments only, and not to be allowed when other charges are overdue."

Shipping instructions always accompany a buyer's order, and are here spoken of in connection with terms because they concern the amount of payment. If the order has instructed a vendor to ship by freight, and he sends the merchandise by express at a greater cost, the retailer will deduct the difference from the amount of the bill. If a violation of shipping instructions causes an increase in shipping charges paid by the retailer, the amount of increase resulting from that violation may be deducted from the bill. The term F. O. B. occurring in shipping instructions means *free on board* and applies to the point to which the vendor will pay transportation charges; "f. o. b. factory" means that the vendor pays no transportation charges; "f. o. b. destination" means that the vendor will pay all transportation charges. An illustration follows:

Invoice dated June 10 for $650. Terms 3/10 net 30. Goods to be shipped f. o. b. destination. Retailer paid $7.00 freight charges and made remittance to vendor on June 20. What was the amount of payment?

Invoice	$650.00
Less 3%	19.50
Discounted bill	$630.50
Freight	7.00
Amount of payment	$623.50

The buyer's responsibility is to secure from the vendor's representative the most advantageous terms possible when he places an order. The terms are recorded on the order, and are transcribed by the vendor to the invoice. The buyer's responsibility, in the matter of discounts, ends with the placing of the order. If a discount is claimed because of anticipation, that function belongs to the controller's department. However, it is important that a

buyer should understand the figuring of anticipation in order to compare relative advantages of different terms.

The buyer is concerned with shipping instructions only to the extent of securing deliveries in time to meet customer demand. A store employs an expert on transportation who makes a study of schedules and rates. This person in cooperation with the office of accounts payable safeguards transportation economies.

REVIEW QUESTIONS

1. State the meaning of each item in the following terms:
   a. 2/10, net 30
   b. 4/10,—90 extra
   c. 2/10, E. O. M.
   d. 3/10, R. O. G.
2. What is meant by anticipation?
3. Is anticipation an ethical practice?
4. In a case of anticipation, is interest figured on the billed or the net amount?
5. What is meant by post dating?
6. Name three kinds of post dating. ([illegible]
7. What is meant by "f. o. b. factory"?
8. When a series of trade discounts are given, are they figured on the billed or net amount?
9. Distinguish between a quantity discount and a period discount.

PROBLEMS

1. When must payment be made on an invoice for $750, dated November 3, terms 6/10 E. O. M.? What will be the amount of payment?
2. A San Francisco firm received from a New York manufacturer an invoice for $1,550 dated September 28. The goods were ten days in transit. The terms were 3/10 R. O. G. When did the bill have to be paid to receive discount? What was the amount of payment?
3. What would be the amount of payment on an invoice for $950, dated December 5, terms 3/10—90 extra, if payment was made December 15, and if 6% was claimed for anticipation?
4. Invoice for $875 dated October 28, terms 8/10 E. O. M., f. o. b. destination. Freight charges of $6.25 were paid by the store. What was the latest date that discount was available? Find the amount of the store's check to the vendor, taking advantage of the discount.
5. A buyer purchased $850 worth of goods on terms 8/10, net 30, dated October 20. They were paid for on January 18. If the vendor charged interest at the rate of 6% per annum for the days that the amount of the invoice was past due, what was the amount of payment?
6. If terms were 2/10—60 extra on an invoice for $995, dated October 15, how much did the store save by paying on October 25, if it claimed 6% for anticipation? If the goods were shipped f. o. b. factory and the freight was $11.25, what was the total cost of the merchandise, assuming that transportation costs are included as part of the cost of merchandise? What was the amount of the check to the vendor?
7. An invoice dated October 1 for $960 carried terms 2/10 R. O. G., f. o. b. shipping point, via freight. The goods were sent by express and were received October 9. The store paid express charges of $8.85. Freight charges would have been $7. Payment was made October 19. What was the amount of the check to the vendor?
8. Which is the more advantageous rate of discount to the retailer on merchandise of a given quality: 2/10—90 extra, or 3/10, net 30?

CHAPTER II

A CHAPTER OF DEFINITIONS INCLUDING ELEMENTS OF THE MERCHANDISING OPERATION

Gross Cost of Merchandise is the price listed on the vendor's invoice without deduction of discount. *Net Cost of Merchandise* is gross cost minus vendor's discount. The first retail price that a buyer puts upon an article of merchandise is called the *Original Retail.* The difference between the cost of the merchandise (usually gross cost) and the original retail is *Initial Mark-up.*[*] The reason that initial mark-up is figured from gross cost rather than net cost of merchandise, is that cash discounts are not deducted until later. An initial mark-up and original retail are placed by the buyer on each separate item of merchandise as soon as an order comes into the store. The controller's department keeps for each selling department a record of discounts. A cash discount is figured on the total of an invoice, and affects gross margin (defined below), but not initial mark-up.

Any reduction of price from original retail is called a *Mark-down.* If merchandise is stolen, a *Shortage* results. An apparent shortage may result from failure to include every article when a physical count is taken.

Receipts from selling merchandise at retail are referred to as *Sales.* A *Gross Sales* figure is found by totalling the amount of sales according to sales-checks. Gross sales minus the retail price of merchandise returned by customers and of allowances made to customers on adjustments, gives *Net Sales.* When the term, *sales,* is used, it is understood to mean net sales.

Initial mark-up less mark-down is *Maintained Mark-up.* The term is descriptive of the meaning. The difference between net cost of merchandise sold and net sales is *Gross Margin* (sometimes called Gross Profit). Disbursements that are made to carry on the selling operation, either directly or indirectly, constitute *Expense.* Expense is paid out of gross margin. If gross margin exceeds expense a *Net Profit* results. If expense exceeds gross margin, a *Net Loss* results.

Inventory means stock of merchandise. *To take inventory* means to count the stock on hand by pieces and prices so that its total value can be ascertained. *Beginning or opening inventory* means the total value of the stock on hand on the first day of any period under consideration, whether a month, six months, or a year. *Closing or resultant inventory,* is the total value of the stock on hand on the last day of any period. *Total inventory* is the total value of stock on hand during an interval of time. For instance, a certain department's stock on hand on March 1st was $500 at retail; $500 was the opening inventory. During March purchases were made, totalling $800 at retail. Therefore, total inventory for the month of March was $1,300. Net sales for the month amounted to $700, leaving a closing inventory of $600 at retail on March 31st. Closing inventory on March 31st is obviously opening inventory for the month of April.

To apply the foregoing definitions, an illustration will be given. It is intentionally simplified to show principles of operation rather than to reproduce an actual situation. An actual operation is always involved with an opening and a closing inventory, and with frequent purchases. This illustration supposes a merchandising operation complete within a month, with all purchases made at one time and all goods sold, so there was no resultant inventory. The principles illustrated in this chapter will be elaborated into actual situations in subsequent chapters. The illustration is as follows:

On March 1st a buyer purchased 100 hand bags at 60 cents each. Sixty dollars was the gross cost of the merchandise. He put a retail price of $1 on each bag; $100 was the total original retail. The initial mark-up was 40 cents on each bag. The total initial mark-up was $40. Inasmuch as he had had no stock on February 28th, and made all purchases for the month on March 1st, the total inventory at original retail for March was $100. During the month, mark-downs became necessary. Ten bags were marked down 20 cents, and five others were marked down to cost, a mark-down of 40 cents on each. The total mark-down was, therefore, $4; i.e., $2 on ten bags, and $2 on five. Thus, the total initial mark-up of $40 was reduced by $4, and maintained mark-up was $36.

On March 31st all the stock had been sold, but sales amounted to only $95. Sales plus mark-downs should equal the total inventory at original retail if there is no closing inventory. If they do not equal original retail, there is a shortage. Sales and mark-downs in this case totaled $99. There was a shortage of $1, since original retail was $100, and there was no closing inventory.

The gross cost of the merchandise was $60, but the manufacturer allowed a cash discount of 5% which amounted to $3 on the lot. Thus, the net cost of the merchandise was $57. This net cost of merchandise deducted from sales of $95, left a gross margin of $38. The expense, direct and indirect, of selling the merchandise, was $37. A net profit of $1 was realized.

The figures that have just been explained will be arranged in equations. But first, abbreviations will be adopted.

ABBREVIATIONS

Cost of Mdse. = cost of merchandise
In. M.U. = initial mark-up
O.R. = original retail
Shtg. = shortage
M.D. = mark-down
S. = sales
G.M. = gross margin
Mtd. M.U. = maintained mark-up
Exp. = expense

EQUATIONS

O.R. $100—gross cost of mdse. $60 = In. M.U. $40
In. M.U. $40 — M.D. $4 = Mtd. M.U. $36
O.R. $100 — (S. $95 + M.D. $4) = Shtg. $1 (no closing inventory)
Gross Cost of Mdse. $60 — discount $3 = net cost of mdse. $57
S. $95 — net cost of mdse. $57 = G.M. $38
G.M. $38 — Exp. $37 = Net profit $1

---

[*] The terms, *mark-up* and *mark-on*, are synonymous. The terms, *initial mark-up* and *purchase mark-up*, are synonymous.

REVIEW QUESTIONS

1. Name two kinds of mark-up and tell the difference between them.
2. What makes the difference between gross and net cost of merchandise?
3. Define original retail. How does it differ from net sales?
4. If expense exceeds gross margin, what is the result?
5. Explain what is meant by opening inventory; by total inventory.
6. Which of the two terms, *gross margin*, and *gross profit*, do you think is better, and why?

PROBLEMS

1. Given:
   Gross cost of mdse. $150
   Total inventory at O.R. $250
   M.D. $15
   Sales $235
   Cash discount 8% of gross cost of mdse.
   Expense $92
   No closing inventory

   Find:
   (a) In. M.U. 100
   (b) Mtd. M.U.
   (c) Net cost of mdse.
   (d) G.M.
   (e) Net Profit or Loss

2. Given:
   Gross cost of mdse. $1,200
   Total inventory at O.R. $2,000
   M.D. $180
   Mtd. M.U. $620
   Shtg. $20
   Cash discount 8% of gross cost of mdse.
   Net profit $36
   No closing inventory

   Find:
   (a) In. M.U.
   (b) Sales
   (c) Net cost of mdse.
   (d) G.M.
   (e) Expense

3. Given:
   Gross cost of mdse. $3,240
   Total inventory at O.R. $5,400
   M.D. $594
   Mtd. M.U. $1,566
   Shtg. $46
   Sales $4,760
   Cash discount 5% of gross cost of mdse.
   G.M. $1,682
   Expense $1,635
   No closing inventory

   Find:
   (a) In. M.U. 2160
   (b) Net cost of mdse.
   (c) Net profit 47

4. Given:
   Gross cost of mdse. $1,500
   Total inventory at O.R. $2,500
   M.D. $225
   Mtd. M.U. $775
   Sales $2,275
   Cash discount 3% of gross cost of mdse.
   Net profit $45
   No closing inventory

   Find:
   (a) In. M.U. 1000
   (b) Net cost of mdse.
   (c) Gross margin 820
   (d) Expense

5. Given:
   Gross cost of mdse. $3,780
   Total inventory at O.R. $6,300
   M.D. $620
   Mtd. M.U. $1,900
   Shtg. $80
   Cash discount 5% of gross cost of mdse.
   Expense $1,955
   No closing inventory

   Find:
   (a) In. M.U. 2520
   (b) Sales
   (c) Net cost of mdse.
   (d) Gross margin
   (e) Net profit

CHAPTER III

PERCENTAGES USED TO WEIGH EXPERIENCE AND PLAN OPERATIONS

In the foregoing chapter the basic mathematical elements in the merchandising process have been shown. The next question that arises is the problem of evaluating these elements to show the degree of efficiency of the merchandising process. For instance, two departments carrying the same line of merchandise showed the following figures at the end of six months:

	Department A	*Department B*
Cost of Mdse.	$19,040	$40,440
In. M.U.	12,040	26,760
O.R.	31,080	67,200
Shtg.	504	990
M.D.	2,576	6,210
Sales	28,000	60,000
G.M.	8,960	19,560
Exp.	10,864	24,000
Profit or Loss	L. 1,904	L. 4,440

How did these two departments compare in operating efficiency? One had a loss of $1,904; the other, $4,440. But the department with the greater dollar loss had a larger sales volume. When a comparison is attempted it becomes apparent that the only way to arrive at a comparison is to find percentages. The cost of merchandise, expense, mark-downs, shortages, and profit, if there is a profit, must all be paid out of the income from sales. Therefore, it is the relationship of these items to sales that determines merchandising efficiency. Sales are consequently taken as 100%, and other items are figured as percentages of sales. The dollar figures cited above for Departments A and B, if converted to percentages, appear thus:

	Department A			*Department B*		
Cost of Mdse.	68%	of S.		67.4%	of S.	
In. M.U.	43%	" "	(38.73% O.R.)	44.6%	" "	(39.82% O.R.)
O.R.	111%	" "		112.0%	" "	
Shtg.	1.8%	" "		1.65%	" "	
M.D.	9.2%	" "		10.35%	" "	
S.	*100%*			*100%*		
G.M.	32%	" "		32.6%	" "	
Exp.	38.8%	" "		40.0%	" "	
Profit or Loss	L. 6.8%	" "		L.7.4%	" "	

These percentages are comparable. A comparison shows relative efficiency in operation at the several points. Department B spent 67.4 cents out of every sales dollar on merchandise, whereas Department A had a 68% merchandise cost. Thus Department B realized a gross margin of 32.6% as against 32% realized by Department A. But Department B spent 40% of sales on expenses; whereas Department A's percentage for expenses was 38.8; so B's relatively better showing on gross margin was more than lost on expenses. Department B had a higher initial mark-up, but most of it was lost through larger retail reductions in the form of mark-downs and shortages. The following arrangement of the percentages will bring this clearly before the eye.

	Department A		*Department B*	
Cost of Mdse.	68.		67.4	
G.M.	32.		32.6	
Exp.	38.8		40.	
Loss	6.8		7.4	
In. M.U.	43.	(38.73)	44.6	(39.82)
M.D. & Shtg.	11.		12.	

Percentages provide a way, the only possible way, of analyzing operations. First they make possible a comparison with other departments; and second they pave the way for scientific planning. A department will use its own percentages for past periods, and comparable percentages available from other stores in evaluating its past performance, and in setting its future goal.*

The preceding paragraphs have shown briefly how to analyze past performance. The following paragraphs will describe certain mathematical steps in planning future operations. But before the next step in the figuring is taken, it is necessary to say that planning future percentages requires a knowledge of merchandise and of customer reactions. It calls for much more than an ability to handle figures. Expenses cannot be reduced merely by writing a lower percentage on a budget sheet; nor can mark-downs be decreased by declaring the intention. Merely writing a new planned figure, and announcing it as a goal, will not make it a reality. The highest merchandising intelligence possessed by the buyer and the merchandise manager will go into various plans for reducing the items that defeat profit. The aspects of those plans which do not directly involve mathematics, are omitted from this chapter; but not without recording the fact that they would require very careful thought. With this explanation, the mathematical process is resumed.

Future operations are usually mapped out six months in advance and include planned sales, initial mark-up, mark-down, and profit; also estimated expense and shortage.** The item whose mathematical derivation calls for special explanation is planned initial mark-up. If a buyer wished to repeat exactly his figures for the last period, his actual past figures would become his planned future figures. But if his future plans depart in any particular from past experience he will need to know how to adjust his planned initial mark-up to bring it into line with his other figures.

Suppose the buyer of Department A cited above is making his plans for the next six months. Although expenses were 38.8% for the last period, definite methods are in prospect whereby it seems reasonable to expect that expenses can be reduced to 35%. A cause of shortages has been removed so that 1% seems a fair estimate for the next period. The mark-downs at

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* Harvard Bureau of Business Research and Controllers' Congress of the N. R. D. G. A. are valuable sources of figures derived from many stores.

** It is customary to use the word *planned* as applied to a goal to be achieved; whereas *estimated* is used to apply to such an item as shortage, which is taken into account because it cannot be escaped.

9.2% were the lowest the department had ever had, and lower than the average for similar departments. Wishing to be conservative, the buyer and merchandise manager plan mark-downs of 9.5%. They plan a profit of .5%. The question arises as to what initial mark-up will make possible these other planned figures.

The buyer's planned percentages in summary are:

Estimated Shtg.	1.0%	of planned sales
Planned M.D.	9.5%	" " "
Estimated Exp.	35.0%	" " "
Planned Profit	.5%	" " "

The question is what average initial mark-up the buyer will have to put upon merchandise in order to carry out this plan. The following equation shows the items that constitute initial mark-up.

$$\text{M.D.} + \text{Shtg.} + \text{Exp.} + \text{Profit} = \text{In. M.U.}$$

Either dollar or percentage figures may be substituted for each of these items with a correct result. Substituting the buyer's planned figures gives the following equation:

$$1\% + 9.5\% + 35\% + .5\% = 46\% \text{ planned initial mark-up.}$$

But the fact must not be overlooked that the planned and estimated percentages on the left-hand side of this equation are all percentages of planned *sales*. Therefore, 46% is a percentage of planned initial mark-up to planned *sales*. In the nature of the case, an initial mark-up must be applied, in the first instance, to original retail.

The next step toward arriving at a solution is to find original retail from these planned percentages. The following equation shows the items that constitute original retail.

$$\text{S.} + \text{M.D.} + \text{Shtg.} = \text{O.R.}$$

If the percentage planned by the buyer and merchandise manager are substituted in the equation, this result follows:

$100\% + 9.5\% + 1\% = 110.5\%$ planned O.R. Dividing planned initial mark-up percentage by planned original retail percentage gives the percentage of planned initial mark-up to original retail

$$46\% \div 110.5\% = 41.6\%$$

Therefore this buyer must have an average initial mark-up of 41.6% in order to carry out his plans. Some articles may receive a higher and some a lower mark-up; but the average will need to be 41.6%. The foregoing explanation leads to this formula:

$$\frac{\text{M.D.} + \text{Shtg.} + \text{Exp.} + \text{Profit}}{\text{S.} + \text{M.D.} + \text{Shtg.}} = \%\ \text{In. M.U. to O.R.}$$

REVIEW QUESTIONS

1. Why are the profits, expenses, mark-downs, and shortages of a past merchandising period expressed as percentages?
2. What item is taken as 100%, and why?
3. What items constitute initial mark-up?
4. Why is it that adding the percentages of mark-downs, shortages, expenses, and profits for the past merchandising period will not give the percentage of initial mark-up for the coming period even if the plan is to duplicate last year's figures?
5. Give the formula for finding the percentage of initial mark-up to original retail when percentages of planned mark-down, shortage, expense, and profit to net sales are known.

PROBLEMS

1. The sales of a certain department for the six months' period from February through July of last year were $48,000. The mark-downs were $5,760; shortages, $462; gross margin, $19,680; expenses, $18,240; net profit, $1,440. The merchandise manager believed that expenses could be reduced 1 per cent in the corresponding period of the coming year. He also planned for an increased profit of 1.5%. He planned on the same percentages of mark-down and shortage as last year.
   a. What were the percentages of
      (1) mark-down .12
      (2) shortage .009625
      (3) gross margin .41
      (4) expense .38
      (5) profit .03
      last year?
   b. What percentage of initial mark-up to original retail will that department use during the planned period of the coming year?
2. Percentages planned for a certain department with relation to sales were as follows: mark-downs, 9%; shortages, 1%; expenses, 36%; net profit, 2%. Find the planned percentage of initial mark-up to original retail.

CHAPTER IV

FIGURING MARK-UP

If an inexperienced assistant buyer were handed a buyer's order, and merely told to put a certain percentage of initial mark-up on the articles there listed at cost, he would probably multiply that cost price by the given percentage and add the result to that cost. If, for instance, the first article on the order were a hand bag with a cost price of 60 cents, and if he were told to apply a 40% initial mark-up, he would probably figure 40% of 60 cents, and conclude that 24 cents was the desired initial mark-up, writing 84 cents as the original retail price. What he needs to find is the mark-up which will be 40% of the original retail which he is to find; i.e., 40% of an unknown quantity. In other words, he should figure mark-up on retail, not on the cost of the merchandise. The reason for this has been developed throughout the preceding chapter. Merchandising efficiency is judged by what becomes of the sales dollar. It is the percentage of the cost of merchandise, of mark-up, of expense, and of profit, *each to the sales dollar*, that has significance. Since maintained mark-up covers expense and profit, it should be known as a percentage of sales; or initial mark-up as a percentage of original retail.

To come back to the assistant buyer's problem: his original retail will be 100%. He wants 40% of that original retail to be initial mark-up. If 100% is original retail, and 40% is initial mark-up, 60% is bound to be the cost of the merchandise. It is already known that the cost of the merchandise is 60 cents. Thus, 60% equals 60 cents, since both values represent cost of merchandise. Then 1% equals 1 cent; and 100% (original retail to be found) equals $1.00. For convenience, this solution is condensed in the following formula:

$$\frac{\text{Cost of Mdse.}}{100\% - \text{In. M.U.\%}} = \text{O.R.}$$

If the illustration just given is viewed from another angle, another formula will appear. When the buyer bought a hand bag for 60 cents and put an original retail price of $1.00 on it, was the initial mark-up 40% as desired? In other words, can the solution above be proved. If he marked up from 60 cents to $1.00, he took a mark-up of 40 cents, which obviously is 40% of $1.00. The equivalent of this statement in a formula is:

$$\frac{\text{In. M.U.\$ or (O.R.} - \text{Cost of Mdse.)}}{\text{O.R.}} = \text{In. M.U.\%}$$

A third formula may be deduced from the same illustration. If the original retail price of $1.00 is multiplied by the cost per cent (100% minus the initial mark-up per cent), the cost in dollars will be found; i.e., $1.00 multiplied by 100% minus 40% equals 60 cents.

$$\text{O.R.} \times (100\% - \text{In. M.U.\%}) = \text{Cost of Mdse.}$$

To demonstrate practical application of these formulas, take the case of a buyer whose original retail prices are inflexible because his price lines are fixed. For instance, if he is managing a dress department, he may sell dresses at $19.50, $25, $29.50, $35, $39.50, and $45. These may be his only prices. They are called *price lines*. This buyer also has a stipulated average initial mark-up. This percentage is established by plans as explained in the preceding chapter. He may use a higher percentage on one garment than on another, but he is aiming to maintain an average which has been decided upon. When a price line is fixed and the desired initial mark-up established, the buyer will ask himself how much he can afford to pay for a garment that he proposes to sell at a certain price and realize the mark-up he desires. If he wants to purchase a dress to sell at his $45 price line, and is desirous of placing a 45% initial mark-up on it, what is the most he can afford to pay?

$$\text{O.R.} \times (100\% - \text{In. M.U.\%}) = \text{Cost of Mdse.}$$
$$\$45 \times (100\% - 45\%) = \$45 \times .55 = \$24.75$$

Suppose a dress which he believes would please his customers is offered to him for $26. He asks himself how much he would fall below his planned initial mark-up if he offered that dress at $45.

$$\frac{\text{In. M.U.\$ or (O.R.} - \text{Cost of Mdse.)}}{\text{O.R.}} = \text{In. M.U.\%}$$

$$\frac{\$45 - 26}{45} = \frac{19}{45} = 42.2\%$$

If this buyer had no established price lines and were trying to realize a 45% initial mark-up, he would proceed by this formula:

$$\frac{\text{Cost of Mdse.}}{100\% - \text{In. M.U.\%}} = \text{O.R.}$$

$$\frac{\$26}{100\% - 45\%} = \frac{26}{55\%} = \$47.27$$

It is important for a department to limit its price lines. If they are not limited, articles which are very similar in appearance and quality will be offered at slightly varying prices. The customer will be confused and will lose confidence. Moreover, the department will be unable to keep stock records of quantities sold at different price lines if the number of lines is unlimited. The absence of such records results in haphazard planning of stocks.

The formulas given above are correct for sales and for gross margin as well as for original retail and initial mark-up, provided they are kept consistent. The initial mark-up may not be used in the same formula with sales, nor the original retail in the same formula with gross margin. Correct forms follow:

$$\frac{\text{Cost of Mdse.}}{100\% - \text{G.M.\%}} = \text{S.}$$

$$\text{S.} \times (100\% - \text{G.M.\%}) = \text{Cost of Mdse.}$$

$$\frac{\text{G.M.\$ or (S.} - \text{Cost of Mdse.)}}{\text{S.}} = \text{G.M\%}$$

These formulas may be proved by testing them on the following set of known figures:

Cost of Mdse	$ .60	
In. M.U.	.40	(40%)
O.R.	1.00	
M.D.	.20	(25%)
Sales	.80	

G.M. = .20 (25%)

$$\frac{\text{Cost of Mdse.}}{100\% - \text{G.M.}\%} = \text{S.}$$

$$\frac{\$.60}{100\% - 25\%} = \frac{\$.60}{75\%} = 80 \text{ cents, Sales}$$

$\text{S.} \times (100\% - \text{G.M.}\%) = \text{Cost of Mdse.}$
$\$.80 \times (100\% - 25\%) = \$.80 \times 75\% = 60 \text{ cents, Cost of Mdse.}$

$$\frac{\text{G.M.\$ or (S.} - \text{Cost of Mdse.)}}{\text{S.}} = \text{G.M.}\%$$

$$\frac{\$.80 - \$.60}{\$.80} = \frac{\$.20}{\$.80} = \tfrac{1}{4} = 25\%$$

100% varies in value from one set of formulas to the other. In the formulas which use original retail and initial mark-up, 100% stands for total original retail; whereas 100% represents total sales in those formulas which use sales and gross margin. Compare, for example, these two formulas:

$\text{O.R.} \times (100\% - \text{In. M.U.}\%) = \text{Cost of Mdse.}$
$\text{S.} \times (100\% - \text{G.M.}\%) = \text{Cost of Mdse.}$

It has been noted that the common practice of department stores is to figure mark-up as a percentage of retail, and the reason for this practice has been explained. If figured on retail, the percentage is a lower figure than if figured on cost. An article which cost 60 cents and was retailed at $1.00 had a mark-up of 40 cents. That mark-up, if figured as a percentage of retail, is 40%; but if figured as a percentage of cost of merchandise, is 66 2/3%.

If mark-up is known as a percentage of retail, it can be converted to a percentage of cost of merchandise by use of the following formula:

$$\text{M.U.}\% \text{ on R} \div (100\% - \text{M.U.}\% \text{ on R}) = \text{M.U.}\% \text{ on C.}$$

If mark-up is known as a percentage of cost of merchandise, it can be converted to a percentage of retail by use of the following formula:

$$\text{M.U.}\% \text{ on C} \div (100\% + \text{M.U.}\% \text{ on C}) = \text{M.U.}\% \text{ on R}$$

The article purchased for 60 cents and marked up 40 cents to $1.00 had a 40% mark-up on retail and 66 2/3% mark-up on cost. Suppose 40% were known as a percentage of retail, but none of the other figures were known. Mark-up figured as a percentage of cost of merchandise could be found thus:

$$40\% \div (100\% - 40\%) = 40\% \div 60\% = 66\ 2/3\%$$

Suppose, on the other hand, that 66 2/3% were known as a percentage of mark-up on cost of merchandise, but that none of the other figures were known. Mark-up as a percentage of retail could be found thus:

$$66\ 2/3\% \div (100\% + 66\ 2/3\%) = \frac{2}{3} \div \left\{ \frac{3}{3} + \frac{2}{3} \right\} =$$

$$\frac{2}{3} \div \frac{5}{3} = \frac{6}{15} = 40\%$$

Average Mark-up or Cumulative Mark-up. On a group of items whose mark-up is figured at retail the mark-up per dollar is not the same as the average of the various percentages. To illustrate:

	Cost	Retail	M.U.$	M.U.%
24 Wool Sweaters	$216	$360	$144	40
20 Skirts	124	200	76	38
40 Blouses	88	160	72	45
	$428	$720	$292	3)123%
				41%

$\frac{\text{In. M.U.\$}}{\text{O.R.}} = \text{M.U.}\%; \frac{\$292}{720} = 40\ 5/9\ \%;$ compare this result with the sum in the last column divided by 3. The percentage derived by that method was 41%. How is the discrepancy accounted for? 41% is indeed the average of 40%, 38%, and 45%. But 41% is not the average mark-up on the dollar; 40 5/9% is that average. That is, if on $720 of retail the mark-up is $292.00, then on $1 of retail the mark-up is $\frac{1}{720} \times \$292.00$, or 40 5/9%.

The practical application of computing average mark-up comes in connection with recording purchases in the book inventory under the retail method described in a later chapter. Purchases are recorded in sequence both at cost and at retail as they are made. The average mark-up on purchases made over a period of time is called a cumulative mark-up. It is this cumulative per cent of mark-up per dollar of retail, and not the average of a series of percentages that is sought. Only in the case of a series of varying percentages on a fixed retail figure will the average be the same by either method of computation. To illustrate:

Cost	Retail	M.U.$	M.U.%
$216.00	$360	$144.00	40
223.20	360	136.80	38
198.00	360	162.00	45
$637.20	$1,080	$442.80	3)123%
			41%

A comparison with the preceding example leads to the following figures:

$\frac{\text{In. M.U.\$}}{\text{O.R.}} = \frac{\$442.80}{\$1{,}080} = 41\%$ mark-up which in this case is the same as the percentage arrived at by adding the three percentages and dividing the sum by 3. Thus it is shown that if the retail (that figure upon which the percentage of mark-up is computed) is a constant figure, the average of a series of percentages will be the same as the cumulative mark-up figured per dollar of retail.

REVIEW QUESTIONS

1. What is meant by figuring mark-up on retail?
2. What is the reason for figuring mark-up on retail?
3. Explain how retail can be found when only the cost of merchandise and desired percentage of mark-up to that unknown retail, are known.
4. If the cost of merchandise and desired retail are known, how can the mark-up per cent be found?
5. If the retail price and the per cent of mark-up are known, how can the cost of merchandise be found?
6. When the term, mark-up, is used, what two kinds of mark-up must be distinguished?
7. Give the two forms of each of the three formulas that involve retail in dollars.
8. Explain what is meant by establishing price lines and tell why stores establish them.
9. Why should the subject of price lines be introduced in connection with a discussion of mark-up?
10. Explain how a cumulative mark-up per cent is found, distinguishing the method from averaging a series of mark-up percentages.

PROBLEMS

1. The buyer's orders at the Oldorf store were in four copies. The first copy was sent to the manufacturer, the second to the controller's office, the third to the New York buying office, and the fourth was kept at the buyer's office. The buyer was required to retail the second, third, and fourth copies. That is, he had to write the retail price for each item on the three copies. In addition, he was required to compute the total retail of the order, the total cost, and the mark-up per cent.

   In the shoe department, an order for 2 dozen pairs of shoes at $7.50 was marked "retail $12.00." The assistant buyer who had worked for some time in another store computed the mark-up per cent as 60%, as he believed it should be expressed as a percentage of cost instead of retail as was the case in the Oldorf store.

   (a) What was the total cost? Total retail?
   (b) How did the assistant buyer arrive at 60%?
   (c) What was the correct mark-up per cent?

2. A new assistant buyer was appointed in the china and glassware department of a large store and without previous instruction was told to retail an order of 100 dozen glasses which cost 60 cents a dozen. He was told that the average department mark-up was about 40% and to retail the glasses accordingly. Believing this to be a percentage of cost, he retailed the glasses at 84 cents a dozen.

   (a) What was the correct retail?
   (b) If the mark-up were to be figured on cost, what would be the correct percentage to use?

3. A buyer purchases the following merchandise:

Quantity	Cost	Retail
3 doz. pr. hose	20.00 doz.	$2.50 pr.
13 1/3 doz. pr. hose	14.00 doz.	1.95 pr.
7 3/4 doz. pr. hose	13.50 doz.	1.75 pr.
6 2/3 doz. pr. hose	12.00 doz.	1.65 pr.

   (a) What is the mark-up per cent at each price?
   (b) What is the mark-up in dollars for the shipment?
   (c) What is the average mark-up % on the shipment?
   (d) Do you get the same result from averaging the mark-up percentages at the several prices as from dividing total mark-up by total retail? Why?

4. Cost, $2.00; retail, $4.00; find percentage of mark-up on cost and on retail.
5. Cost, $5.00; mark-up percentage on cost, 60%; find retail and mark-up percentage on retail.
6. Cost, $5.25; mark-up percentage on retail, 37.5%; find retail.
7. Retail, $12.50; mark-up percentage on retail, 35%; find cost.
8. Mark-up $6.75; mark-up percentage on retail, 35%; find cost.
9. Percentage of mark-up on cost, 50%; find percentage of mark-up on retail.
10. Percentage of mark-up on retail 45%; find percentage of mark-up on cost.
11. Percentage of mark-up on cost, 60%; find percentage of mark-up on retail.
12. Percentage of mark-up on retail, 40%; find percentage of mark-up on cost.
13. A buyer went to the market to purchase dresses to retail at $29.50. His average initial mark-up was 40%. How much could he pay for a dress to be retailed at $29.50 and have a 40% initial mark-up? 17.70
14. According to his budget, a buyer may spend $250 on merchandise during the last week in a certain month. If he invests that amount in goods, at an average mark-up of 45%, by how much does he increase the retail value of stock in his department? $454.
15. A manufacturer of women's hats finds that it costs him $5.50 to turn out a certain style. He wants to make a profit of 5 per cent on cost and he expects to have to allow terms of 7/10. What price will he ask? N.S.
16. The misses' dress department had established very definite price lines as follows: $18.75, $25.00, $29.50, $35.00, $39.50. All dresses were sold in these price lines. An order was given a manufacturer for 20 dresses at a cost of $16.50 each. The buyer wished to get a mark-up of at least 38%. These dresses were a good value and very new in style and cut. When ordering, the buyer could not decide at what

price she should retail them. She believed in appearance they were slightly better than her $25.00 stock, yet she did not know whether or not they would sell at $29.50.

(a) At what figure would the dresses be retailed if there were no price lines?

(b) What would be the mark-up percentage if she retailed them at $25?

(c) What would be the mark-up percentage if she retailed them at $29.50?

17. In the glove department of a medium-price department store the best selling lines in lambskin and kid gloves were $1.50, $1.95, $2.50, $3.50, and $4.50. Over 85% of the sales in the department were made in these five price lines. Therefore, the buyer and the merchandise manager agreed that it was the best policy to keep these lines well stocked. The average department mark-up was found to be 37.19%, so the buyer felt that she must get at least this amount of mark-up for the coming year, and did her buying for spring with this in mind.

(a) What is the highest amount she can pay for gloves to retail at each price line and still have an initial mark-up of 37.19%?

CHAPTER V

CANCELLATION OF MARK-DOWN AND ADDITIONAL MARK-UP

A cancellation, whether of mark-down or of additional mark-up, is a revision of price in the direction of original retail. A revision either upward or downward that passes the mark of original retail ceases to be a cancellation.

If merchandise has been marked down just for a special sale to attract customers, a store sometimes restores the original retail to the articles remaining after the special event. Such restoration of original price constitutes a *mark-down cancellation.*

A buyer of silk yard goods marked down 1,800 yards of silk which had retailed for $3.50 to $2.95 during a special sale. The mark-down amounted to 55 cents on the yard, or $990. The sale lasted for ten days during which time 1,500 yards were sold. At the end of the sale, the remaining 300 yards were restored to their original retail of $3.50. This revision constituted a mark-down cancellation of 55 cents on the yard, or $165.

It sometimes happens that merchandise looks better to a buyer when it reaches the department than it looked when he ordered it. In such a situation he may want to make an upward revision on the original retail; or there may have been an error in marking which necessitates a similar revision. A revision upward from original retail constitutes an *additional mark-up.* Sometimes goods which has been given an additional mark-up may subsequently have to be repriced at a lower level. Such a reduction in price constitutes a *cancellation of additional mark-up* unless it brings the price below original retail. If the reduction brings the price below original retail, the amount that the reduction falls below original retail is mark-down.

A buyer purchased 24 wool sweaters which he retailed at $10.50. When they reached the department, he found they were superior to his $10.50 line, so he marked them up to his next price line, which was $12.00. This revision was an additional mark-up of $1.50 on each sweater, or $36.00 on the lot. Eighteen sold at $12.00. Six of a color which proved to be less popular became slow selling and were remarked at $10.50. This constituted a mark-up cancellation of $1.50 on each sweater, or $9.00 on the six. The last one, which became soiled, was sold for $6.50. The difference between this price and the original retail of $10.50 constituted a mark-down of $4.00.

REVIEW QUESTIONS

1. Why is it sometimes necessary to take additional mark-ups?
2. Why may an additional mark-up need to be cancelled?
3. What is the difference between a mark-up cancellation and a mark-down?
4. What situation may give rise to mark-down cancellation?
5. How does a mark-down cancellation differ from an additional mark-up?

PROBLEMS

1. In the Heislar store, a lot of 1,200 pairs of stockings was purchased at $1.30 a pair and the order retailed at $1.95. However, after the hosiery reached the department, the buyer felt that they were of better quality than his regular $1.95 line, so he decided to sell them at $2.25 a pair. His average department mark-up was 35.74%, so this gave him a considerably higher mark-up than usual. The stockings were accordingly marked up to $2.25 and sold at that price.
   (a) What was the amount of the additional mark-up?
   (b) What was the initial mark-up?
   (c) What was the new mark-up percentage?

2. The buyer in the toy department received a shipment of 500 dolls on November 1. They cost $2.50 each and were retailed at $4.00 each. Four dollars had been the best price line from a point of view of sales during the previous year. Another lot of dolls received a day or two later was also retailed at $4.00, and placed in the department. It was at once evident that the first lot were much better values. The buyer accordingly ordered that these dolls be marked $4.50. There had been 50 sales, so only 450 were marked at this price. In December the $4.00 line became much depleted, and to fill it in, the buyer ordered the remaining dolls in the $4.50 line to be marked down to $4.00. There were 75 of the 500 left and they were reduced to $4.00.
   (a) What was the original mark-up %?
   (b) What was the new mark-up %?
   (c) What was the amount of the additional mark-up in dollars?
   (d) What was the amount of the mark-up cancellation in dollars?

3. A shipment of foreign merchandise contained ten imported gowns which were retailed at $250 each. After they reached the department, the buyer decided to retail them at $295 and they were accordingly marked up to this price. As they were very advanced in style, they did not sell readily and at the end of six months, the buyer found he still had 7 on hand. These were marked down to $250, but only 2 were sold in the next month, and at the beginning of the new season, the buyer priced the remaining dresses at $135 in the hope that they would sell. At this low price all were quickly disposed of except 1 which was soiled. This was finally sold for $95.
   (a) What was the amount of the additional mark-up?
   (b) What was the amount of the mark-up cancellation?
   (c) What was the total amount of the mark-downs?

4. In the Fuller store, all mark-downs were recorded in a mark-down book. It was the assistant buyer's duty to record all desired mark-downs in this book and then send it to the merchandise office for authorization. On July 6, 1933, the assistant buyer in the corset department found that a certain style of brassiere retailing at $1 was not selling well. In order to clean out the stock, she wished to mark them down to 75 cents. She found that there were 84 in the stock. Accordingly, she made out the requisition and sent it to the office for signature. What was the amount of the reduction desired?

5. The buyer in the blouse department purchased a lot of 240 blouses at a cost of $6, retailing them at $10. At the end of two months, he found that all but 40 had been sold. Of this 40, 4 or 5 were slightly soiled, and the others were in very large sizes. Also, he found that the demand for this style blouse was nearly over. He, therefore, decided to mark them down to $7.50. This was done and the blouses sold.
   (a) What was the amount of the mark-down in dollars?
   (b) What was the original mark-up percentage?
   (c) What was the final mark-up percentage on the last 40?
   (d) What was the gross-margin percentage on the whole lot?
   (e) What was the percentage of mark-downs, if all the remaining blouses were sold at $7.50: that is, what percentage of net sales were mark-downs?

6. Through an error, the publicity department advertised a sale of 1,000 pairs of hose at $1.65, regular $1.95 value, before the merchandise was actually received. Therefore, on the morning of the sale, the hosiery buyer was forced to mark down 1,000 pairs of his regular $1.95 stock to $1.65. Fortunately, it was a very stormy day and only 600 pairs were sold, so on the following day he remarked the 400 pairs which were not sold to $1.95. As he had anticipated a considerable loss from this mistake, he was glad to be able to return the 400 pairs to stock without further loss.
   (a) What was the amount of the mark-down?
   (b) What was the amount of the mark-down cancellation?

CHAPTER VI

PROFIT AND LOSS STATEMENT

The items in a profit and loss statement can be logically grouped. The plan of this chapter is to take the basic item out of each group and connect it with other basic items to show in simplified form the frame-work of a profit and loss statement upon which a complete statement is built.

In the succeeding paragraphs three exhibits are used to explain the structure of a profit and loss statement. Exhibit 1 presents only a bare framework in the most simplified form. Exhibit 2 adds some items that are not included in Exhibit 1. Exhibit 3 adds still other items. It coincides with the Merchandise Statement in the form for a Profit and Loss Statement which appears at the end of this chapter.

The numeral on the left-hand side of any item in the exhibits, is the same numeral used for that item in each statement in which it occurs. The numerals may be disregarded in first studying Exhibit 1, but they will be found useful in comparing the second with the first, and the third with the first and second.

Exhibit 1

3.	Net Sales	$250,000
13.	Total Merchandise Costs	150,000
14.	Gross Margin	100,000
15.	Expense	95,000
16.	Net Profit	5,000

Net sales minus total merchandise costs equals gross margin; gross margin minus expenses equals net profit.

A department or a store is interested to know its percentage of gross margin, of expenses, and of net profit. It is only through percentage that a comparison can be made with another store or with the previous year's figures for the same store; unless, of course, the net sales figure should be identical, in which case a statement in dollars would have some meaning.

Percentages are always figured in relation to net sales which are taken as 100%. In the case just given, the gross margin percentage is $100,000 ÷ $250,000, or 40%.

The percentage of expenses to net sales is $95,000 ÷ $250,000, or 38%.

The net profit percentage is $5,000 ÷ $250,000, or 2%; or the difference between 40% and 38%.

The second statement follows and gives additional items leading up to the same figures as in the first statement. The two sets of figures should be compared, and additions noted.

Exhibit 2

1.	Gross Sales	$252.500	
2.	Returns and Allowances to Customers	2.500	
3.	Net Sales		$250,000
9.	Gross Cost of Merchandise Sold	$160,628	
10.	Discounts from Vendors	12,500	
11.	Net cost of Merchandise Sold		148,128
12.	Alteration Costs		1,872
13.	Total Merchandise Costs		150,000
14.	Gross Margin		100,000
15.	Expense		95,000
16.	Net Profit		5,000

Before other items are added to the statement, attention is called to the sources of the figures above. The gross sales, No. 1, is a figure obtained from sales checks. No. 2 is obtained from credit slips. No. 3 is derived by subtracting No. 2 from No. 1. No. 9 is also derived. The explanation of that derivation will appear in the next paragraph. No. 10 is obtained from manufacturers' invoices. No. 11 is derived by subtracting No. 10 from No. 9. No. 12 is the total of costs that have been incurred for alterations that may have been made at department expense. Not every department has alteration costs. When there are such costs they are added to the net cost of merchandise sold and the sum is called Total Merchandise Costs, No. 13. No. 14 is derived by subtracting No. 13 from No. 3. The controller has a record of all expenses incurred in the merchandising operation. The sum of them is No. 15. No. 16 is derived by subtracting No. 15 from No. 14.

Exhibit 3

1.	Gross Sales	$252,500	
2.	Returns and Allowances to Customers	2,500	
3.	Net Sales		$250,000
4.	Beginning Inventory at Cost	$50,000	
5.	Purchases at Cost	160,250	
6.	Inward Freight, Express and Cartage	11,000	
7.	Gross Cost of Merchandise Handled	$221,250	
8.	Closing Inventory at Cost	60,622	
9.	Gross Cost of Merchandise Sold	$160,628	
10.	Discounts from Vendors	12,500	
11.	Net Cost of Merchandise Sold	$148,128	
12.	Alteration Costs	1,872	
13.	Total Merchandise Costs		150,000
14.	Gross Margin		100,000
15.	Expenses		95,000
16.	Net Profit		$ 5,000

The same numerals have been used in the left-hand column to designate items which occurred in the previous statement. Items introduced for the first time in this statement, that is, items No. 4 to No. 8, inclusive, are used to obtain No. 9, gross cost of merchandise sold. Item No. 4, beginning

SCHEDULE FOR DEPARTMENT STORES

PROFIT AND LOSS STATEMENT, for year ending ....19....

MERCHANDISE STATEMENT

GROSS SALES ....
RETURNS AND ALLOWANCES TO CUSTOMERS ....
Net Sales 100%
NET INVENTORY OF MERCHANDISE AT BEGINNING OF YEAR ....
NET PURCHASES OF MERCHANDISE............ ....
INWARD FREIGHT, EXPRESS, AND TRUCKAGE ....
Gross Cost of Merchandise Handled.................... ....
NET INVENTORY OF MERCHANDISE AT END OF YEAR ....
Gross Cost of Merchandise Sold.. ....
CASH DISCOUNTS RECEIVED ON PURCHASES OF MERCHANDISE ....
Net Cost of Merchandise Sold......................... ....
ALTERATION COSTS ....
Total Merchandise Costs ....
Gross Margin ....

EXPENSE STATEMENT

	Administrative and General		Occupancy	Publicity	Buying		Selling			TOTAL
							General Selling		Delivery	
SALARIES AND WAGES	EXECUTIVE	....					DIRECT SELLING	....		
	OTHER ADMIN.	....			BUYING	....	MANAGERS AND ASSISTANTS	....		
	OFFICE	....	....	....	RECEIVING, MARKING, AND STOCK-ROOM	....	INDIRECT SELLING	....	....	....
RENTALS	LEASED BUILDINGS	XXXXXXX	....	....		....		XXXXXXX	....	
	OWNED BUILDINGS	XXXXXXX	....	....		....		XXXXXXX	....	....
ADVERTISING		XXXXXXX	XXXXXXX	....		XXXXXXX		XXXXXXX	XXXXXXX	....
TAXES		....	....	XXXXXXX		....		....	....	....
INTEREST	INTEREST ON BORROWED CAPITAL	....	....	XXXXXXX		XXXXXXX		XXXXXXX	....	
	INTEREST ON OWNED CAPITAL	....	....	XXXXXXX		XXXXXXX		XXXXXXX	....	....
SUPPLIES		....	....	....		....		....	....	....
SERVICE PURCHASED		....	....	XXXXXXX		XXXXXXX		....	....	....
UNCLASSIFIED		....	....	....		....		....	....	....
TRAVELLING		....	....	....		....		....	....	....
COMMUNICATION		....	....	....		....		....	....	....
REPAIRS		....	....	XXXXXXX		XXXXXXX		XXXXXXX	....	....
INSURANCE		....	....	....		....		....	....	....
DEPRECIATION	LOSSES FROM BAD DEBTS	....	XXXXXXX	XXXXXXX		XXXXXXX		XXXXXXX	XXXXXXX	....
	OTHER DEPRECIATION	XXXXXXX	....	XXXXXXX		XXXXXXX		XXXXXXX	....	....
PROFESSIONAL SERVICES		....	....	....		XXXXXXX		....	XXXXXXX	....
TOTAL		....	....	....		....		....	....	....

NET GAIN STATEMENT

Gross Margin ....
Total Expense ....
Net Profit or Loss ....
SUNDRY REVENUE, NET (including all income from investments) ....
INTEREST AND RENTALS EARNED
Total Interest on Owned Capital.................................... ....
Total Rental of Owned Buildings....................................
Less Expense on Owned Real Estate (including taxes, insurance, repairs, depreciations and interest on mortgages)........................ ....
Total Net Gain or Loss..
PROVISION FOR FEDERAL AND STATE INCOME TAXES ....
DIVIDENDS, SHARINGS, OR WITHDRAWALS ....
Surplus or Deficit for the Year.. ....

(Reprinted by permission of Harvard Bureau of Business Research) inventory at cost is the same figure as closing inventory at cost for the preceding period. Item No. 5 is obtained from vendors' invoices. Item No. 6 is considered a part of the cost of merchandise. This is to be distinguished from delivery costs which stores usually charge to expense. The sum of items No. 4, No. 5, and No. 6 results in No. 7, the gross cost of merchandise handled. From this is subtracted Item No. 8, the closing inventory at cost. This figure may be obtained either by taking a physical inventory at cost, or it may be derived from a book inventory if the retail method is followed. This will be further explained in the chapter on the retail method of inventory. It is evident that if a store knows the gross cost of the merchandise handled during a certain period, and the cost of the goods on hand at the end of that period, it can find the cost of the goods sold by subtracting the latter figure from the former. Thus the derivation of No. 9, gross cost of merchandise sold, is explained.

Expenses include salaries and wages, advertising, delivery, heat, light, and power, rentals, interest on capital, insurance, depreciation, supplies, travelling and communication. Since all expenses in a store must be paid out of the sales dollar, selling departments must bear the expense of the non-selling departments. Salaries and wages of employees in a selling department are obviously direct expenses of that department. The same is true of the expense of advertising its merchandise, or the expense of the trips of its buyer to the market. But the case is different with the wages of elevator operators, or of porters and maids. There are office expenses and other expenses, which are not incurred by any given selling department. These expenses are prorated to the selling departments. The prorating of expenses is a function of the controller. It is not discussed in these pages. A classification of expenses is given by the Harvard Bureau of Business Research, a reprint of whose schedule appears at the end of this chapter.

REVIEW QUESTIONS

1. Give the formula for finding gross margin.
2. When gross margin is known what other figure must be known before net profit can be found?
3. Gross margin expressed as a percentage is understood to be a percentage of gross margin to what other figure?
4. Why do stores want to know the percentages of gross margin, expenses, and net profit to net sales?
5. How is the amount of net sales found?
6. From what other figures is net cost of merchandise sold derived?
7. How is the beginning inventory at cost found?
8. How does a store find the gross cost of merchandise sold?
9. How does it find the gross cost of merchandise handled?
10. If there are alteration charges, how are they treated?

PROBLEMS

1. The gross sales in the silk department in the Nellums store for the year 1933 were $75,328; returns and allowances to customers, $3,520. The department records showed that purchases at cost during the year had been $48,421; and that there was still on hand in the department

$12,723 worth of merchandise at cost. The inventory at cost on January 1, 1933, according to the records, was $13,562.29.

   (a) What was the net sales figure?
   (b) What was the cost of merchandise sold?
   (c) What was the gross margin?

2. The buyer in the glove department of the Naish store wished to determine approximately his net profit or loss for the year before any statement was issued by the office. From his profit and loss sheet for the previous year, he found that his inventory at cost at the beginning of the present period was $30,264; his net sales from his own records were $102,348; and his purchases at cost $65,281. A physical inventory had just been taken at cost, and this figure was $22,161.48. To the figure which he had for the direct expenses of his department for the year he added the amount of indirect expenses that had been prorated to his department for the previous year. This gave him a total expense figure of $30,192.66.

   (a) What did the buyer estimate his net profit or loss to be?
   (b) What was his estimated gross margin?
   (c) Percentage of gross margin?

3. A buyer in a furniture department doing a business of about $100,000 a year was told that his percentage of gross margin for the year was 36.8%. His expense percentage was 35%. He had thought that he was making a net profit of about 3%, but according to these figures his net profit was considerably less.

   (a) What was his percentage of net profit?
   (b) What was the amount of net profit in dollars?
   (c) What (in dollars) did the buyer expect his net profit to be?

4. The following figures applied to the operation of a rug department: Net sales, $272,264; opening inventory at cost, $79,482; purchases at cost, $155,672.50; closing inventory at cost, $52,302; total expense, $89,302.60. Draw up these figures in an orderly statement and answer the following questions:

   (a) What was the percentage of net profit?
   (b) Percentage of gross margin?
   (c) Percentage of total expense?

5. It had been the practice in the Merton store to consider inward freight and express and cartage in the same manner as delivery costs. That is, they were treated as expense to be covered by gross margin. In talking with store managers from other stores, the controller found that the general practice in retail stores was to consider freight and cartage inward as a part of the purchase cost of merchandise. As this seemed a more logical way of handling these costs, the controller decided to adopt the method. The gross sales for the year 1929 were $928,793; returns and allowances to customers, $3,060.25; opening inventory at cost, $204,562.25; purchases at cost, $525,274.42; freight and cartage, $20,672; closing inventory at cost, $187,569.80; expenses, $334,095.16.

(a) What was the cost of merchandise sold?
(b) What was the gross margin?
(c) What was the net profit?
(d) Find percentages of gross margin, expenses, and net profit.

6. Arrange these figures in an orderly statement, and find the percentage of net profit: Expenses, $2,500; net sales, $10,500; discounts from manufacturers, $280; closing inventory at cost, $3,200; inward freight, express and cartage, $600; purchases at cost, $6,500; opening inventory at cost, $3,000.

7. Arrange these figures in an orderly statement, and find the percentage of net profit: Inward freight, express and cartage, $1,300; discounts from vendors, $700; net sales, $20,000; opening inventory at cost, 6,800; closing inventory at cost, $7,000; purchases at cost, $13,000; expenses, $5,900.

8. Arrange these figures in an orderly statement and find percentages of gross margin, expense, and net profit: Net sales, $5,500; discounts from vendors, $160; opening inventory at cost, $1,800; closing inventory at cost, $2,000; expenses, $1,000; purchases at cost, $3,900; inward freight, express and cartage, $350.

CHAPTER VII

RETAIL METHOD OF INVENTORY

The Retail Method of Inventory is the process of taking physical inventory or count at retail prices. When this method is used, the retail figures are copied on the inventory sheets, and totals are figured from the retail prices. When physical inventory is to be taken at cost, the price ticket on each article carries code symbols signifying the cost, and these symbols must be translated into numerical values which are recorded on the inventory sheet. It is apparent that the process of taking a physical count of goods is easier when retail prices can be copied from a ticket than when a code symbol must be decoded for each article.

However, the advantages or disadvantages of either method cannot be weighed alone by the consideration of taking physical inventory. The book inventory or the daily system of bookkeeping which accompanies either method must be taken into consideration. It will be recalled from the section on profit and loss statements that net profit is the excess of gross margin over expenses; that gross margin is the excess of sales over cost of merchandise sold; and that cost of merchandise sold is the excess of cost

BOOK INVENTORY UNDER THE RETAIL METHOD

	Cost	Retail	M. U. $	M. U. %
1. Opening inventory	$ 50,000	$ 85,000		
2. Purchases	160,250	288,500		
3. Additional M. U., $1,700, less cancellations, $200		1,500		
4. Inward freight, express and cartage	11,000			
5. Total inventory plus additions	$221,250	$375,000	$153,750	41
6. Gross sales			252,500	
7. Returns and allowances to customers			2,500	.99% gross sales
8. Net sales			$250,000	
9. Mark-downs, $20,500, less cancellations, $500			20,000	8% sales
10. Total deductions		270,000		
11. Closing book inventory R		105,000		
12. Physical inventory R		102,750		
13. Stock shortage		2,250		.9 % sales
14. Closing inventory C	60,622.50			
15. Gross cost merchandise sold	160,628			
16. Discounts from vendors	12,500			5% sales
17. Net cost merchandise sold	$148,128			
18. Alteration costs	1,872			
19. Total merchandise costs	150,000			
20. Gross margin	100,000			40% sales
21. Expense	95,000			38% "
22. Net profit	5,000			~~20%~~ " 2%

of all the merchandise handled during a period over the cost of what is on hand at the end of that period. It is to this last item that attention is here drawn. If physical inventory is taken at cost, obviously that count gives the closing inventory at cost. But if physical inventory is taken at retail, then the sum of the figures gives the closing inventory at retail. This figure must be converted to a cost figure in order that it may be subtracted from the cost of merchandise handled to give the cost of merchandise sold. It will be recalled that in the chapter on figuring mark-up, the formula was given for finding cost when retail and mark-up percentage were known. Retail is multiplied by 100% minus mark-up % to find cost. This process of applying the complement of mark-up per cent to the closing inventory at retail to find closing inventory at cost, is the crux of the difference between the two inventory methods.

Turn to Exhibit 3 in the preceding chapter on Profit and Loss Statement. Notice that closing inventory and other figures which cannot be derived until it is known, are obtainable under the cost method of inventory, only as frequently as a physical inventory is taken. When the retail method is followed, the book inventory which accompanies the method, makes it possible to arrive at the cost of a closing inventory, at the cost of merchandise sold, and at gross margin, as frequently as desired. The figures necessary to compute these items are current and available all the time. A more detailed examination of the items will show how this is true.

In the Book Inventory Line 1 is the closing inventory of the preceding period at cost and retail; i.e., lines 12 and 14 of the record for the preceding period. Line 2 is the record at cost and retail made when goods are bought. The book inventory may include here a series of items for purchases in each week of a month. Line 3 is recorded only in the retail column. Additional mark-ups increase the cumulative retail of the total inventory. Line 4 is recorded only in the cost column. It covers all costs of transporting merchandise into the store. These costs are considered as part of merchandise costs, not of expenses. Line 5 calls for a record in four columns. The cost column of total inventory records the same information as that given in a Profit and Loss Statement under the name of Gross Cost of Merchandise Handled. The cost of the total inventory is subtracted from the cumulative retail in column 2, line 5, to find column 3 which is the mark-up in dollars. The figure in column 3 is divided by that in column 2 to find the mark-up per cent, column 4. This is the *cumulative initial mark-up: cumulative* because it averages the mark-up on a number of purchases plus the opening inventory; and *initial* because mark-downs have not yet been taken into account. Returns and allowances to customers, line 7, is subtracted from gross sales, line 6, to find net sales, line 8. Next, the net amount of the mark-downs is found by subtracting mark-down cancellations from the gross amount of mark-downs, and this net amount, line 9, is added to sales to find total deductions from the retail inventory, line 10. The logic of adding mark-downs to sales will be apparent if it is borne in mind that the desired figure is total deductions from the retail value of the stock on hand. A dollar of mark-down decreases the retail value of the stock on hand, as definitely as does a dollar in sales. If mark-downs are not recorded, deduction from total inventory appears too small, the resultant inventory appears too large, cost of merchandise sold appears too small, gross margin appears too large, and the net profit figure is thus inflated. One consequence of such a miscalculation is to increase an income tax

When mark-downs have been added to sales, the total deductions are subtracted from the total inventory plus additions at retail (line 5, column 2, minus line 10), and the remainder is closing book inventory at retail, line 11. A physical inventory taken at the same time the book inventory figures were computed showed that stock on hand was $102,750 at retail, line 12. The physical count revealed a shortage of $2,250, line 13.

If merchandise is stolen, the book inventory has no record from which to make the deduction from total inventory. Therefore, stores consider it necessary to take an actual count once or twice a year. To be sure, an actual physical count may be inaccurate. If the difference between physical and book inventories is great, a recount will be called for. Approximately 1% of net sales is not an excessive amount of shortage. If merchandise in display windows, in a comparison office, or out for repairs, fails to be recorded when physical inventory is taken, there will appear to be a shortage which does not actually exist. This, however, is not an argument against taking physical inventory. It is only an indication that care needs to be exercised to obtain a degree of accuracy which will make the physical count a valuable check. If a shortage occurs, the physical inventory figure is accepted instead of the book figure for resultant retail inventory.

A physical inventory will not be taken every time the closing book inventory is computed. But, between the dates of taking physical inventory, an estimated shortage figure may be used. If a given department has a shortage of approximately 1% every time physical inventory is taken, then this department will estimate a shortage of 1% whenever the closing inventory figure must be found.

The next step in keeping the book inventory is the one already described as the basic process in the retail method. The physical inventory at retail, $102,750, is multiplied by the complement of the cumulative initial mark-up percentage (100% — 41% = 59%). By this method the cost of the closing inventory is found. Under the cost method a closing inventory is available only at the time of taking physical inventory unless a cost audit method is used, and a book inventory kept at cost. The cost audit method necessitates getting cost figures from all sales checks. Under the retail method the book inventory makes a closing inventory figure at cost available as frequently as desired.

The availability of inventory figures at frequent intervals suggests another advantage of the retail method. The accuracy of a stock turnover figure depends upon the accuracy of the average inventory figure. The average of monthly inventory figures is more accurate than the average of two figures for beginning and end of a year.

Cost of closing inventory, line 14, is subtracted from total inventory plus additions at cost, line 5, column 1, to find gross cost of merchandise sold, line 15. From this item, through to net profit, the method is the same as that employed in the Profit and Loss Statement.

If a store is on the cost method of taking inventory, the federal income tax regulations permit it to evaluate its closing inventory at "cost or market, whichever is lower." By "cost" is meant the amount actually paid for the goods. If the present value is less than actual cost, the store may make an appraisal and subtract depreciation. If a store is on the retail method, its mark-downs automatically depreciate the recorded cost of the closing inventory. The book inventory under the retail method does not compute the actual cost of closing inventory, but does present a plan for computing present value of that inventory. The following figures will illustrate. In order to isolate the effect of mark-downs, a case is supposed in which a purchase was made, the goods retailed, and then mark-downs taken before anything had been sold.

	Cost	Retail	M.U.$	M.U.%
Opening inventory	$0,000	$0,000		
Purchases	3,000	5,000		
Total inventory plus add.	$3,000	$5,000	$2,000	40%
Net sales			000	
Mark-downs			500	
Total deductions		500		
Closing Inventory Retail		$4,500		
Closing Inventory Cost	$2,700			

The method just used shows the cost of closing inventory to be $2,700. Since nothing had been sold, it is known that the closing inventory was the same as the purchases, and that they cost $3,000. But inasmuch as mark-downs had to be taken, the value of the inventory had depreciated and the retail method automatically records that fact.

A Weakness of the Retail Method of inventory is that the average percentage of mark-up on the total inventory plus additions may not be the actual percentage on the articles left in the resultant inventory. Yet it is the percentage whose complement is used to convert the resultant retail inventory to cost. The cumulative initial mark-up percentage was an average of the percentages on opening inventory and purchases whose percentages of mark-up may have differed. A great many more articles of one mark-up percentage may have been sold than of another mark-up percentage. Thus it would come about that the mark-up on the remaining articles was not actually the percentage whose complement was used to find cost. An example follows:

In a certain department, 40 sweaters were purchased at $4.80 and retailed at $7.20. Another lot of 25 were purchased at $7.50 and retailed at $15. None of the sweaters with the higher mark-up had been sold when the closing book inventory was figured. All of the lower mark-up sweaters had been sold.

	Cost	Retail	M.U.$	M.U.%
40 sweaters	$192.00	$288.00	$96.00	33 1/3
25 sweaters	187.50	375.00	187.50	50
Total Inventory	$379.50	$663.00	$283.50	42.76
Sales		288.00		
Resultant R. Inventory.....		$375.00		
Resultant C. Inventory.....	$214.65 (375 × (100% — 42.76%))			

By applying the complement of the initial mark-up percentage to the resultant retail inventory, a closing inventory figure of $214.65 is obtained. However, it is known that the remaining sweaters which were retailed at a total of $375, actually cost $187.50. The discrepancy arises from the fact that the goods of lower and higher mark-up percentages did not sell in the

FORM FOR COMPUTING INVENTORY ACCORDING TO THE RETAIL METHOD

	Cost	Retail	Mark-up	Per cent of Mark-up
1. Opening inventory (lines 9 and 11 of preceding period)	....	....	....	....
2. Purchases	....	....	....	....
3. Freight, express and cartage, inward	....	XXX XX	XXX XX	XXX XX
4. Additional mark-ups, less additional mark-up cancellations	XXX XX	....	XXX XX	XXX XX
5. Total of inventory plus additions..	....	....	....	....
6. Net sales	XXX XX	....	XXX XX	XXX XX
7. Mark-downs, less mark-down cancellations	XXX XX	....	XXX XX	XXX XX
8. Total retail deduction (sum of items 6 and 7)..................	XXX XX	....	XXX XX	XXX XX
9. Resultant retail inventory (retail inventory on line 5, column 2, minus item 8)	XXX XX	....	XXX XX	XXX XX
10. Calculation of cost percentage: (a) Total percentage ......100% (b) Percentage of mark-up (line 5, col. 4) ....% (c) Percentage of cost (a) minus (b) ....%				
11. Cost inventory (item 10 (c) applied to item 9)..................	....	XXX XX	XXX XX	XXX XX
12. Gross cost of merchandise sold (difference between cost inventories on lines 5 and 11)...............	....	XXX XX	XXX XX	XXX XX
13. Discounts earned on merchandise purchases	....	XXX XX	XXX XX	XXX XX
14. Net cost of merchandise sold (item 12 minus item 13)	....	XXX XX	XXX XX	XXX XX
15. Gross margin (item 6 minus item 14)	....	XXX XX	XXX XX	XXX XX

same proportions in which they were bought and were recorded in the book inventory for the derivation of the purchase mark-up.

The answer to this objection to the retail method of inventory is that if merchandise is classified within departments, so that there is not a great divergence among mark-ups, the discrepancies tend to balance each other in the long run.

REVIEW QUESTIONS

1. Why is it easier to take physical inventory on the retail than the cost method?
2. What figure is easily derived under the retail method that cannot be found except by physical inventory or a cost audit of sales checks under the cost method?
3. What is meant by the complement of mark-up per cent?
4. How is the formula for finding cost when retail and mark-up per cent are known, used in the retail book inventory?
5. Where are additional mark-ups included in a retail book inventory?
6. Other items being the same, what effect do additional mark-ups have on the percentage of mark-up on total inventory plus additions?
7. Where are mark-downs included in a retail book inventory?
8. What effect does omission of mark-downs have on the gross margin figure? On the net profit figure?
9. Under the cost method of inventory, what provision is made for recording the effect of mark-down on net profits?
10. State a weakness in the retail method of inventory.
11. What compensation is there for this weakness?
12. If closing inventory, gross margin and net profit can be computed as frequently as desired by means of the book inventory under the retail method, why should physical inventory ever be taken?

PROBLEMS

1. The assistant buyer in the umbrella department of the Wilson store had charge of the physical inventory. The stock shortages in this department in previous years had been large, and for that reason the assistant buyer was especially careful to supervise the inventory taking in great detail. All inventory sheets were carefully checked and many verifications made of counts, so he felt it was as accurate as possible. The inventory was taken at retail, all mark-down sheets had been put through, and all merchandise in the advertising office, display department, stockroom, comparison office, and out for repairs had been counted as accurately as possible.

   It was the practice in this store to order a recount if the shortage was over 1% of net sales, and the assistant buyer was very anxious to see whether he would have to take a recount or not. The book inventory figure for the period was $10,262.75, and the physical inventory figure was $9,271.25. The net sales for the department were $85,272.50.

   (a) Should a recount be made?
   (b) What is the amount of the shortage?
   (c) What percentage is the shortage of net sales?

2. The Fisk department store had always taken inventory on a cost basis, but in 1926 decided to change to the retail method of inventory, principally because this method would enable them to have monthly book figures of the amount of merchandise on hand in the various departments. At the end of the month of January, 1934, the figures for one department were as follows:

   Opening inventory at cost, $2,560; at retail, $3,960.
   Purchases at cost, 4,720; at retail, 6,521.
   Net sales 7,252.

   (a) What was the closing inventory at retail?
   (b) What was the closing inventory at cost?
   (c) What was the cost of goods sold?
   (d) What was the gross margin?

3. The following figures applied to the Randall department store in 1933:

   Opening inventory at cost, $43,000; at retail, $57,000.
   Purchases at cost, 55,000; at retail, 74,000.
   Inward freight and express 1,500;
   Net Sales 94,200.
   Physical inventory at end of year 36,500.

   (a) What was the amount of stock shortage?
   (b) What was the amount of the closing inventory at cost?
   (c) What was the amount of the cost of goods sold?
   (d) What was the gross margin?

4. The figures of the china department of the Wilcox store for the year ending February 1, 1930, were as follows:

   Opening inventory at cost, $26,320; at retail, $48,721.
   Purchases at cost, 59,421; at retail, 98,667.
   Additional mark-ups 520.
   Mark-up cancellations 18.
   Inward freight and express 2,081;
   Net sales 118,320.
   Mark-downs 726.
   Mark-down cancellations 52.
   Physical inventory (closing) 28,522.
   Expenses 47,232.

   (a) What was the closing book inventory at retail?
   (b) At cost?
   (c) What was the cost of goods sold?
   (d) What was the gross margin?
   (e) What was the net profit?
   (f) What was the stock shortage?

5. Arrange these figures according to the formula for a book inventory and find the percentage of net profit: Net sales, $30,000; expenses,

$8,000; inward freight, express and cartage, $900; opening inventory at cost, $9,300; opening inventory at retail, $15,000; additional mark-ups, $800; purchases at cost, $15,500; purchases at retail, $25,000; mark-downs, $1,500.

6. Arrange these figures according to the formula for book inventory and find the percentage of gross margin and of net profit: Net sales, $1,402,000; alteration charges, $870; opening inventory at cost, $384,400; inward freight, express and cartage, $14,000; discounts on purchases, $12,000; opening inventory at retail, $620,000; purchases at retail, $890,000; additional mark-ups, $2,100; mark-downs, $51,000; expenses, $450,000; purchases at cost, $551,800.

7. Arrange these figures according to the formula for book inventory, and find the percentage of gross margin and of net profit: opening inventory at cost, $8,680; opening inventory at retail, $14,000; expenses, $6,000; purchases at retail, $24,000; additional mark-ups, $600; purchases at cost, $14,880; net sales, $24,000; inward freight, express and cartage, $800; mark-downs, $1,400.

8. A dress department stocked 6 imported gowns which cost $115 each. They were marked up to $235. A lot of 25 dresses was purchased at the same time from a New York manufacturer for $31.85 and retailed at $49. If, at the end of a month, all the dresses at the lower price had been sold and none of the imported ones had been sold, and if an inventory should be taken on only this stock by the retail method, (a) what would that inventory be at cost, and (b) how much would the figures differ from the actual cost of the dresses that were left?

CHAPTER VIII

TURNOVER

The Word Turnover as used in stores means the disposal and replacement of a value. There are two kinds: capital turnover and stock turnover.

Capital Turnover is the disposal and replacement of an investment. **Investment** may have two interpretations. It may be taken to mean capital invested in merchandise, or capital invested in the business as a whole. If the former interpretation is used the capital turnover is found by dividing sales by the average inventory at cost. If the latter meaning is given the term, capital turnover is found by dividing sales by amount of capital invested in the business. Every business is undertaken for the use of capital. The use of stock is only a means to this end. However, the means employed is the key to successful operation. It is the disposal and replacement of the goods with which a buyer is concerned; and it is in connection with stock turnover that many questions of merchandising policy arise. Therefore, the following paragraphs will concern themselves entirely with stock turnover.

Stock Turnover may be found by either of two formulas:

$$\frac{\text{Sales}}{\text{Average inventory at retail}} = \text{stock turnover}$$

$$\frac{\text{Cost of sales}}{\text{Average inventory at cost}} = \text{stock turnover}$$

It might appear that these two formulas would give the same result. If maintained mark-up and initial mark-up are the same, the same result is obtained by either formula. But if, under the retail method of inventory, the initial and maintained mark-up percentages differ, the stock turnover computed on retail prices will differ from the one computed on cost prices. An example follows:

Retail Book Inventory Giving Cost of Sales

	Cost	Retail	Mark-up
Opening inventory	$3,000	$5,000	
Purchases	6,000	10,000	
Total inventory	$9,000	$15,000	40%
Net sales			$10,000
Mark-downs			600
Total deductions		10,600	
Closing retail inventory		4,400	
Closing cost inventory	2,640		
Cost of sales	$6,360		

Stock Turn at Retail

Opening inventory	5,000
Closing inventory	4,400
	2)9,400
Average inventory	4,700
Sales = $10,000	
10,000 ÷ 4,700 = 2.12	

Stock Turn at Cost

Opening inventory	3,000
Closing inventory	2,640
	2)5,640
Average inventory	2,820
Cost of sales	$6,360
6,360 ÷ 2,820 = 2.25	

Thus it is seen that when the retail method of inventory is used, the stock turn figured on cost is .13 higher than figured on retail.

If there had been no mark-downs in the case just cited, the net sales and total deductions would have been the same, and the initial and maintained mark-up would have been the same; the average inventory at retail would have been $5,000, sales $10,000, stock turn 2. The average inventory at cost would have been $3,000, cost of sales $6,000, and stock turn 2, again.

Average Inventory. An accurate stock turn figure cannot be derived without an accurate average inventory. Opening and closing inventories are both apt to be smaller than the inventories at any other time of year. Stores make an effort to reduce stock at the time of inventory taking. This fact indicates an advantage of the retail method of inventory under which the book inventory makes monthly figures available. These are necessary to an adequate estimate of the average.

Relation of Stock Turn to Net Profit. It has been said in a previous paragraph that a buyer is more concerned with stock turnover than with capital turnover, because the former has more bearing upon the efficiency of his merchandising operation. It remains to inquire in what way this is true.

An article costing $1.00 is sold for $1.50. The gross margin is 50 cents. If the cost of selling is 45 cents, the net profit is 5 cents, which is 3 1/3% of sales, or 5% of the investment in merchandise.

If this operation is repeated, a profit of 5 cents is again realized. In the two operations, $2.00 have been invested, $3.00 have been received from sales, 90 cents have been paid out for expenses, and a profit of 10 cents has been realized. The percentage of profit to sales is still 3 1/3%, and to investment, 5%.

But suppose two operations did not cost twice as much as one. If the two articles were purchased for $2.00, and sold for $3,00, and if the expense of selling two were only 80 cents, instead of 90 cents, the net profit would be 20 cents, or 6 2/3% of sales, and 10% of the investment. As long as expense percentage and gross margin percentage remain the same, net profit percentage is not affected by increasing turnover. The amount only will be increased by increasing turnover—not percentage. If, however, gross margin percentage could be kept constant, and expense percentage could be reduced, net profit percentage would be increased by increasing the stock turnover.

The following quotation from *Operating Results of Department and Specialty Stores in 1929*, published by the Bureau of Research of Harvard University will answer the question as to whether or not advantages have attended increased turnovers.

"There are distinct tendencies for relatively high rates of turnover to be found associated with increasing sales, low mark-downs, low interest expense, low total expense, and better-than-average profits. In spite of the emphasis that has been placed on stock-turn in the past few years, there still is much lack of understanding regarding its effect on expense and profit. Apparently increases in the rate of stock-turn are facilitated by increases in volume, so that some of the conditions often said to be the result of high stock-turn may really be the result of increasing sales. Cases in point are low payroll expense and low fixed plant and equipment expense. It does seem likely, however, that higher-than-average rates of stock-turn may be largely responsible for low mark-downs and low interest expense."

REVIEW QUESTIONS

1. Name two kinds of turnover.
2. Give the formula for finding stock turnover.
3. Why is stock turnover derived from figures under the retail method usually less than stock turnover derived from figures under the cost method?
4. Why is a more accurate stock turnover figure obtainable when monthly inventories are taken than when inventory is taken only twice a year?
5. What in general is found to be the effect of increased stock turnover on net profit?

PROBLEMS

1. The buyer in the negligee department was of the opinion that his stock-turn was too low, though he had no very accurate figures to substantiate this. During the year 1926, his stock-turn as computed by the office was 4.5. This was figured on the basis of his opening and closing inventories for the year. He believed that a more accurate stock-turn figure could be secured by the use of his monthly book inventories. Therefore, he computed his stock-turn on that basis for the first six months of the year 1927, and found that it was exactly the average quoted in the N.R.D.G.A. bulletin for negligee departments. His inventories by months were as follows:

	Retail
Jan. 1	$7,322.05
Jan. 31	4,272.60
Feb. 28	5,629.30
Mar. 31	7,821.90
April 30	5,722.20
May 31	7,627.20
June 30	6,721.00

His net sales for the same period were $16,241.85.

(a) What was his average inventory?

(b) What was his stock-turn for the six months?

2. A new assistant buyer in the draperies department had had no experience in reading financial reports. The profit and loss statement for the fiscal year ending February 1, 1930, showed that the department gross margin was 36.67% of the net sales, expense 33.20%, net profit 3.47%, and stock-turn 1.83. The net sales figure was $50,262.00.

From these percentages the assistant buyer computed the net profit of the department as $3,191.68, believing that it was 1.83 times as much as if the stock had only turned once.

(a) What was the actual net profit?

(b) How did he arrive at the net profit figure, $3,191.68?

3. From the following figures a buyer wished to compute stock-turn:

	Cost	Retail
Opening Inventory	$2,000	$3,200
Purchases	4,200	7,000
Sales		6,000
Mark-downs		460

(a) What was the average inventory at retail?

(b) What was the stock-turn figured on retail?

(c) What was the average inventory at cost?

(d) What was the stock-turn figure on cost?

(e) Explain the discrepancy between the two stock-turn figures.

4. Average inventory at retail, $5,000; stock-turn, 4; gross margin, 30% of sales; expense, 25% of sales; net profit, 5% of sales. With a stock-turn of 5, same inventory, same percentage of gross margin, expense increased $500, what would be the percentage of net profit to sales?

5. Average inventory at retail, $3,500; stock-turn, 1.5; gross margin, 30% of sales; expense, 29.5% of sales; net profit, .5% of sales. With a stock-turn of 2.5, same average inventory, gross margin 29.5% of net sales, expense increased $413.00, what would be the percentage of net profit to sales?

CHAPTER IX

THE MERCHANDISE BUDGET

The Merchandise Budget is a plan based on experience and sales prospects, made to guide purchasing procedure. A well-worked-out purchasing program has two phases: a control of physical units; that is, the number of single items to be bought in the various price lines, styles, sizes, and colors; and a control of financial investment. It is the control of financial investment with which this chapter is concerned.

The financial budget is to the buyer a guide as to how much to invest and when to purchase. It is to the controller a forecast of the capital that will be invested in merchandise. A merchandise budget usually outlines a plan for six months. It must be based upon past experience and facts that prove trends. A plan based upon hope offers inadequate security for outlay of money. A six months' merchandise budget includes plans for sales, stocks at beginning and end of each month, stock-sales ratios, mark-downs, and purchases at retail and at cost.

Planned Sales is the figure from which other items in the budget are drawn. This figure should be planned in the light of the trend of the business over a period of years. Five years' figures are sufficient to show a trend. However, a trend in a store may be reversed by general business conditions outside the organization, or by local conditions within it. A strike in a garment makers' union or a change in the personnel of a coat department may be cause for distrusting the effect of a general trend on a local situation. It requires careful weighing of all circumstances which might have bearing upon the successful operation of a department to set a figure which shall stimulate effort on the one hand, and not be too optimistic on the other. A figure which is set too high may induce special sales events and increased volume, but may not always result in increased profits.

Planned Stock figures in a budget are computed as a ratio of planned sales. The plan is to determine the amount of stock that should be on hand at the beginning of each month to make possible the amount of sales planned. If the stock is too low it will be impossible to have proper assortments. Sales will be lost as a result. If stock is too high the turnover will be too low and the usual disadvantages of a low turnover will result. What constitutes the right amount of stock for the beginning of a month depends not only upon the planned sales figures, but also upon the line of merchandise under consideration. Style merchandise requires a quicker turnover to show profits than does staple merchandise. Therefore, beginning of month stocks should be lower percentages of sales for the style goods than for the staple.

Stock-Sales Ratio is the expression of percentage of stock to sales. The percentage of actual stock to actual sales for any given month last year is used as a starting point in planning the proportion of stock to sales for the corresponding month this year. For instance, if a certain department began the month of March, last year, with a stock of $26,250 at retail, and sold during March $35,000 worth of merchandise, its stock-sales ratio for

March was .75; i.e., \$26,250 divided by \$35,000. Suppose that after comparison of its results with results of other departments carrying the same line of goods, this department concludes that .75 was a very good proportion of stock to sales for that merchandise in that month. On the basis of this conclusion .75 will be used in planning the stock with which to begin the coming March. Suppose planned sales for the coming March are \$36,000. The desired beginning of month stock will be .75 times \$36,000 or \$27,000. The method is summarized as follows: Beginning of month (B. O. M.) stock divided by sales equals stock-sales (S. S.) ratio.

$$\frac{\text{B. O. M. Stock}}{\text{Sales}} = \text{S. S. Ratio}$$

Sales multiplied by stock-sales ratio equals beginning of month stock.

$$\text{Sales} \times \text{S. S. Ratio} = \text{B. O. M. Stock}$$

In practice the first formula applies to actual figures for a past period. This second formula applies to planned figures.

It has already been pointed out that a low stock-sales ratio is consistent with a high turnover. Attention is now called to the precise nature of this relationship. A stock-sales ratio inverted, approaches the turnover figure. And if beginning of month stock and end of month stock should be the same, the inverted stock-sales ratio would be exactly the turnover figure. To illustrate: if both the beginning of month stock and end of month stock for March should be \$26,250, then the average inventory for March would be \$26,250. Sales of \$35,000 divided by average inventory of \$26,250 would equal 1 1/3. The stock-sales ratio was .75 or 3/4. Three fourths inverted is 4/3 or 1 1/3.

It is obvious that the end of month stock for any month is the beginning of month stock for the succeeding month. It is necessary in planning for the six months' period from February to July, inclusive, to plan end of month stock for each of the months named, and also to know end of month stock for January. Thus a total of seven end-of-month stock figures provides the data for comparing beginning and end-of-month plans for each month of the six.

Planned Mark-Downs. It has been found that mark-downs are inevitable. The retail value of merchandise has already depreciated when the need arises to mark it down. To keep stock fresh and complete, the loss in value through mark-downs must be replaced by purchases. The fair percentage of mark-downs to sales varies with the merchandise. Specialty shops whose merchandise is nearly all subject to sharp style changes average a higher percentage of mark-downs than do department stores, which include departments carrying staple merchandise. When the percentage of probable mark-downs to planned sales for six months has been decided upon, the dollar amount is distributed among the months, the heaviest mark-downs being taken just after the peak of a style season. At the end of a season manufacturers are offering goods at greatly reduced prices. The retailer who purchases merchandise at end-of-season low cost will retail it at a price which will force competitors to take mark-downs if they have purchased when the market was higher.

Planned Purchases at Retail are found by adding sales to mark-downs* and then adding the increase of planned end-of-month over beginning-of-month stock, or subtracting the decrease of planned end-of-month from beginning-of-month stock. In the following equation every figure is a planned figure:

$$\text{Sales} + \text{M.D.} \begin{cases} + \text{ increase of E.O.M. over B.O.M. Stock} \\ - \text{ decrease of E.O.M. from B.O.M. Stock} \end{cases} = \text{Purchases}$$

Planned Purchases at Cost. When a buyer goes to the market he must know what he can spend at cost. Therefore, purchases planned at retail must be converted to cost. This is done by applying to the retail figure the complement of the planned mark-up per cent. Of course planned purchases at retail means original retail and the mark-up per cent means initial mark-up per cent. Therefore, the formula given in an earlier chapter is applicable here:

$$\text{O.R.} \times (100\% - \text{In. M.U.}\%) = \text{Cost of Mdse.}$$

The second question that arises is the question as to how the initial mark-up per cent is arrived at. This question has been fully answered in the chapter entitled, "Percentages Used to Weigh Experience and Plan Operations." This formula is recalled as the one which applies here:

$$\frac{\text{M.D.} + \text{Shtg.} + \text{Exp.} + \text{Profit}}{\text{S.} + \text{M.D.} + \text{Shtg.}} = \%\ \text{In. M.U. to O.R.}$$

The figures in the formula are all figures planned with reference to planned sales. The formula converts them to a percentage of original retail. It is the complement of the planned per cent of initial mark-up to original retail which must be applied to planned purchase at retail to find planned purchases at cost.

The reader is referred to the accompanying chart of a merchandise budget. The figures given on the chart are derived as follows:

For February, the stock-sales ratio of 1 was found by dividing last year's beginning-of-month stock by last year's sales for February; (\$24,500 ÷ \$24,020); the resultant ratio of 1 was multiplied by planned sales for February this year to find planned beginning of month stock; (\$25,940×1 = \$25,940); to find planned purchases at retail, sales would be added to mark-downs, but no mark-downs were planned; planned end-of-month stock was \$27,667 as against beginning-of-month stock of \$25,940; the planned increase was added to planned sales to find planned purchases at retail: \$25,940 + (\$27,667 — \$25,940) = \$25,940 + \$1,727 = \$27,667.

Planned purchases at retail were multiplied by the complement of the planned initial mark-up per cent to find planned purchases at cost: \$27,667 × (100% — 39%) = \$16,876. Planned figures for the other six months are found by the same method as that just described for February. Figures for actual performance when recorded on the chart might make necessary a change in the planned figures as the season progressed.

Open-to-Buy is an expression which means that a buyer has not invested in merchandise all that his budget allows for the month. The amount that he is open-to-buy is the additional investment that he may make without exceeding that budget.

Planned purchases minus (total receipts plus outstanding orders) equals open-to-buy.

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* Shortage reserves may be added to planned mark-downs.

MERCHANDISE BUDGET

Months	SALES						STOCKS—RETAIL				MARK-DOWNS		PURCHASES—RETAIL				PURCHASES—COST	
	2 Years Ago	Last Year	Planned by Months This Year	Planned Cumulative	Actual by Months	Actual Cumulative	Last Year	Stock-Sales Ratio	Planned by Months This Year	Actual by Months	Planned in Dollars	Actual in Dollars	Planned by Months	Planned Cumulative	Actual by Months	Actual Cumulative	Planned	Actual
Jan. 31	....	....	....	....	...	.	24,500	....	25,940	....	....	.....	....	....	....	....	..	....
Feb. 28	....	24,020	25,940	...	....	..	24,270	1.	27,667	....	0	.....	27,667	..	...	..	16,876	....
Mar. 31	....	36,772	41,920	..	..	..	18,386	.66	20,209	....	1,276	...	35,738	......	..	..	21,800	......
Apr. 30	....	35,455	40,418	...	..	..	18,936	.5	20,451	....	5,106	......	45,766	......	..	.....	27,917	......
May 31	....	28,692	30,987	....	..	...	16,394	.66	17,705	....	1,276	.....	......	......	.....	.....	..	.....
June 30	...	24,840	26,827	....	...	..	15,513	.66	16,754	....	5,106	......	......	..	...	....	....	....
July 31	....	23,505	25,385	....	..	...	...	.66	16,900	45	2,553	....	......	.	......	......	......	.....
Total	....	173,284	191,477	..	...	...	.....	...	145,626	....	15,317	...	....	.....	....	......	....	..

Planned Average Stock $29,803
Planned Sales 191,477
Planned Stock Turnover 9
43% ÷ 109% = 39%, planned initial mark-up to original retail.

Estimated expense	28%	sales
Planned mark-downs	8%	"
Estimated shortage	1%	"
Planned net profit	6%	"
Planned initial mark-up	43%	"

Sales	100%
Planned mark-downs	8%
Estimated shortage	1%
Original retail	109%

The planned purchases at cost on the accompanying chart were $16,876 for February. If on February 15th, the buyer had purchased $10,208 and if he had $2,100 on order or in transit, his commitment to date would total $12,308 and he would be open-to-buy $4,568.

REVIEW QUESTIONS

1. Mention the various considerations that enter into planning sales.
2. What is the importance of planning the stock for the beginning of each month?
3. How is a stock-sales ratio found?
4. How is a stock-sales ratio used?
5. What relationship is there between a stock-sales ratio and a stock turnover?
6. How are mark-downs planned?
7. Give the formula for finding planned purchases at retail.
8. Give the formula for finding planned purchases at cost.
9. How is a percentage of initial mark-up to original retail found?
10. What is meant by open-to-buy and how is it found?

PROBLEMS

1. In making up his department plans for the last six months of a certain year, a buyer in a toilet goods department believed he could show an increase in planned sales of about 10%. His department had done a business of $100,000 in the preceding year, and his sales for the last half of the year represented $55,800 of this amount, $18,600 of the last six months' business being done in December. The sales in the other five months were practically even. With these facts in mind, he distributed the 10% increase among his planned figures.
   (a) What was the total increase?
   (b) How much should be assigned to December?
   (c) How much to each of the other months?
2. In the Miller store the planned sales for the glove department for the last six months of 1933 were as follows: July, $1,380; August, $1,300; September, $4,380; October, $11,930; November, $13,400; and December, $25,740. Mark-downs the previous season were 7% of the net sales; selling and advertising were 9.4% and 3%, respectively. The buyer believed these expenses could each be reduced 1% and planned accordingly, distributing the decrease over the whole period.
   (a) What was the amount of planned mark-downs in dollars for each month?
   (b) What was the amount of planned selling expense for each month in dollars?
   (c) What was the amount of planned advertising expense in dollars for each month?

3. The buyer in the luggage department of the Sullivan store was making six months' plans for the period ending December. He had planned sales of $11,920 for July; $9,320 for August; $7,940 for September; $5,150 for October; $5,380 for November; and $19,340 for December; basing these figures on his previous year's experience. His stock turn for the previous year was 3.19, and he had planned a stock turn of 4 for the current year. He decided to plan his end-of-month stock in accordance with the Merchandise Purchase Control Bulletin, published by the N.R.D.G.A., which says, "It is a safe working rule to plan retail stock at the end of each month to equal planned sales of the next three months."
   (a) What was his planned end-of-month stock for each of the six months, providing for business in January, February, and March of the next year, of $6,060, $4,870, and $4,820, respectively?
   (b) What was his planned stock turn for each month from August to December, inclusive
4. Given estimated expense of 27%, planned mark-downs of 6%, estimated shortage of 1%, and planned profit of 5%, find (a) planned initial mark-up %; (b) planned original retail %; (c) percentage of planned initial mark-up to planned original retail.
5. Given estimated expense of 28%, planned mark-downs of 7%, estimated shortage of 1%, planned profit of 4%, find: (a) planned initial mark-up %; (b) planned original retail %; (c) percentage of planned initial mark-up to planned original retail.
6. The buyer in the silverware department had made up his six months' plan with the exception of the purchase figures when he was taken ill and the assistant buyer was obliged to finish. He had never worked on these plans before, but with the aid of a formula he completed the plans which were approved by the merchandise office. The figures on the plan read as follows:

	July	Aug.	Sept.	Oct.	Nov.	Dec.
Planned sales	4,660	5,330	6,700	7,650	10,000	27,120
Planned mark-downs	372	426	536	612	800	2,170
Planned E.O.M. Stock	12,030	14,350	17,650	37,120	32,800	12,250
Planned M.U.%	42%	42%	42%	42%	42%	42%
Estimated expense	31%	31%	31%	31%	31%	31%

Planned purchases
(The merchandise on hand in the department on July 1 was $10,260)

   (a) What was the planned purchase figure for each month?
   (b) What was the total planned purchase figure?

7. In the Leighton store, the buyers received weekly reports of open-to-buy. On the first of January, the planned sales in the corset department were $9,150. The planned E.O.M. stock was $24,160. The stock on hand that day was $22,120, and stock on order amounted to $520. Planned mark-downs for the month were $630. How much was the department open-to-buy?

8. On May 9, figures relating to open-to-buy for the sweater department of the Naish store were as follows:

Planned sales for month	$7,480
Actual sales to date	1,272
Planned mark-downs for month	825
Actual mark-downs to date	122
Planned E.O.M. stock	11,190
Stock on hand May 1	6,220
Stock on order May 9	1,020
Stock in transit	235

What was the amount of open-to-buy?

9. Given: planned stock for August 1, $5,940; planned stock for August 31, $6,580; planned sales, $7,000; planned mark-downs, $450; find planned purchases at retail. All figures are at retail.

10. Using planned purchases at retail found in Problem 9, find planned purchases at cost by employing the following data: estimated expense, 37% of sales; planned profit, 2%; planned retail mark-downs, 12%; estimated shortage, 1% at retail.

APPENDIX

COMMON FRACTIONS

A Fraction. A quantity expressed as any number of aliquot (equal) parts of a unit.

A Common Fraction. A fraction written with a numerator and a denominator; e.g., 3/5; 3 is the numerator, 5 is the denominator. This fraction signifies that a unit has been divided into five equal parts, and that three of those parts have been taken.

Common fractions are of two kinds, proper and improper.

A Proper Fraction is one whose numerator is smaller than its denominator; e.g., 3/5. **An Improper Fraction** is one whose numerator is larger than its denominator, e.g., 5/3.

A Mixed Number is a number which consists of an integer and a common fraction; e.g., 1 2/3. A mixed number can always be converted into an improper fraction, and vice versa; e.g., 1 2/3 = 5/3.

A Common Denominator is a denominator which two or more fractions have alike; e.g., 2/7 and 3/7.

Fractions not having a common denominator can be reduced to common denominators by the following method. Select a number for a new denominator, in which each of the unlike denominators is contained without a remainder. Divide this new denominator by the denominator of the fraction to be reduced, multiply the quotient by the numerator, and write the product as the new numerator above the new number selected for a common denominator; e.g., 1/6 and 3/8; let 24 be the new denominator

$$24 \div 6 = 4;\quad 4 \times 1 = 4;\quad 1/6 = 4/24.$$
$$24 \div 8 = 3;\quad 3 \times 3 = 9;\quad 3/8 = 9/24.$$

Lowest Terms. Fractions are said to be in their lowest terms when there is no integer greater than 1 by which numerator and denominator can each be divided without leaving a remainder. If a fraction is not in its lowest terms it can be reduced by dividing both numerator and denominator by the largest integer contained in each without a remainder, e.g., 16/48 = 1/3. Divide both numerator and denominator by 16.

Addition of Fractions

Rule. Reduce fractions to a common denominator, add new numerators, and write the sum over the common denominator; e.g., 1/6 plus 3/8 = 4/24 plus 9/24 = 13/24.

Problems

1. A customer buys cotton suiting of one price and quality in three colors: ½ yards of white, 1⅛ yards of green, and 1⅛ yards of tan. How much does she buy in all?
2. 15-4/6 + 2-1/9 + 3-9/18 = ?
3. 11-2/11 + 5-1/2 + 18-3/4 = ?
4. 10-2/309 + 2/3 = ?
5. 1/8 + 20 + 67-1/3 + 1/6 = ?

Subtraction of Fractions

Rule. Reduce fractions to a common denominator, subtract the numerator of the subtrahend from the numerator of the minuend, and write the remainder as the new numerator over the common denominator; e.g., 2/3 — 1/8 = 16/24 — 3/24 = 13/24.

In mixed numbers, the fractional part of the subtrahend may be larger than the fractional part of the minuend. In that case, one unit must be borrowed from the integral part of the minuend and added to the fractional part of it; e.g., 6-1/2 — 2-2/3 = 6-3/6 — 2-4/6; but 4/6 cannot be taken from 3/6, therefore 1 is borrowed from the 6 and added to 3/6; 1 = 6/6; 3/6 + 6/6 = 9/6. The problem then becomes, 5-9/6 — 2-4/6 = 3-5/6.

Problems

1. A drapery department sent out a bolt of drapery material on approval to an interior decorator. The bolt contained 30 yards when it went out. When it was returned it contained 13-5/8 yards. How many yards did the decorator keep?
2. 105-6/15 — 29-6/7 = ?
3. 15-3/17 — 2/3 = ?
4. 101-4/9 — 17-5/7 = ?
5. 26-3/5 — 16-5/8 = ?

Multiplication of Fractions

Rule. Multiply numerators for a new numerator, and denominators for a new denominator. Reduce mixed numbers to improper fractions when necessary. Cancel when possible; e.g., 1-1/2 × 2-1/3 × 4-3/4 = 3/2 × 7/3 × 19/4 = 133/8 = 16-5/8.

Problems

1. If a customer needs 2-3/8 yards of material for one curtain, how much will she need for 3 pairs?
2. 1/2 × 2/3 × 1/4 = ?
3. 1-1/3 × 2-1/4 × 3-1/6 = ?
4. 8-1/3 × 9-1/5 = ?
5. 11-2/7 × 15-2/3 = ?

Division of Fractions

Rule. Invert the numerator and denominator of the fraction which is the divisor and proceed as in multiplication of fractions; e.g., 4-1/2 ÷ 2-1/3 = 9/2 ÷ 7/3 = 9/2 × 3/7 = 27/14 = 1-13/14.

Problems

1. A customer bought 5-1/3 yards of crash which she cut into six equal lengths for tea towels. How much material went into each towel? Obtain the answer first in terms of yards; then express it in inches.
2. 6-2/5 ÷ 4-1/2 = ?
3. 8-2/10 ÷ 1-1/2 = ?
4. 4-5/7 ÷ 3-1/3 = ?
5. 1/3 ÷ 5-1/8 = ?

DECIMAL FRACTIONS

A Decimal is a fraction expressed in terms of tenths or powers of tenths. The symbol which characterizes the decimal fraction in writing, is the decimal point. All digits on the right-hand side of the decimal point express a decimal fraction; digits on the left express an integer. The digits on the left and the right of a decimal point are comparable to the integer and fraction, respectively, of a mixed number; e.g., 1.1 = 1-1/10.

The digits on the right of a decimal point taken in order from the left to right, indicate tenths, hundredths, thousandths, ten-thousandths, hundred-thousandths, millionths.

1/10 = .1 = one-tenth.
2/100 = .02 = two one-hundredths.
7/1,000 = .007 = seven one-thousandths.
15/10,000 = .0015 = fifteen ten-thousandths.

12,622/100,000 = .12622 = twelve thousand six hundred twenty-two hundred-thousandths.

Problems

Write the following decimals:

1. Eight tenths.
2. Fifteen hundredths.
3. Seven and two one-hundredths.
4. Ten and one one-thousandth.
5. Six hundred two one-thousandths.
6. Twenty-nine ten thousandths.
7. One hundred fifty-six hundred-thousandths.
8. One hundred two and eight ten thousandths.
9. Six and six millionths.
10. Five hundred five and five thousandths.

Addition and Subtraction of Decimals

Rule. Write the numbers in a column, keeping the decimal points in a perpendicular line, and proceed as in the addition or subtraction of whole numbers. The United States currency whose denominations are based upon the division of the dollar into hundredth parts or cents, provides a familiar example of the use of decimals. And the arrangement of a column of dollars and cents written for adding, illustrates the use of decimal points that must be followed in writing any column of decimals for addition.

Problems

1. $15.65 + $.09 + $200 + $1.10 = ?
2. $1,000 — $602.57 = ?
3. 1.01 + 200.002 + 6.08197 = ?
4. 100.001 — 6.985 = ?
5. 2,658.021 — 1,057.5689 = ?

Multiplication of Decimals

Rule. Follow the same procedure as in multiplying whole numbers. Point off from right to left in the product as many decimal places as there are in the multiplicand and the multiplier; e.g., $.2 \times 2 = .4$; $.2 \times .2 = .04$; $.02 \times .02 = .0004$.

Problems

1. If a merchant sold $250,000 worth of goods and made a profit of $.03 on each dollar, what would be his total profit?
2. $125.68 \times .21 = ?$
3. $28{,}236 \times .02 = ?$
4. $5.67 \times 8.26 = ?$
5. $42.66 \times .009 = ?$

Division of Decimals

To Divide a Decimal by a Whole Number. Place the decimal point in the quotient exactly in line with the decimal point in the dividend. The first digit in the quotient will be in line with the right-hand digit of that group in the dividend which first contains the divisor. Ciphers should fill any spaces that may occur between this first digit in the quotient and the decimal point; e.g.,

$$\begin{array}{r} .25 \\ 25\overline{)6.25} \\ \underline{5\,0} \\ 1\,25 \\ \underline{1\,25} \end{array} \qquad \begin{array}{r} .025 \\ 25\overline{).625} \\ \underline{50} \\ 125 \\ \underline{125} \end{array}$$

To Divide by a Decimal. Multiplying both dividend and divisor by the same number does not affect the quotient. When the divisor is a decimal, it should be multiplied by ten or that power of ten which will make it a whole number. The dividend should be multiplied by the same number. The process of division should then proceed as stated above in the method of dividing by a whole number; e.g.,

$$.625 \div .25 = (.625 \times 100) \div (.25 \times 100) = 62.5 \div 25 = 2.5$$

$$\begin{array}{r} 2.5 \\ 25\overline{)62.5} \\ \underline{50} \\ 12\,5 \\ \underline{12\,5} \end{array}$$

It should be noted that the effect of multiplying any decimal by ten or a power of ten is to move the decimal point as many places to the right as there are ciphers in the multiplier; e.g.,

$$.0625 \times 10 = .625$$
$$.0625 \times 100 = 6.25$$
$$.0625 \times 1{,}000{,}000 = 62{,}500.$$

In reverse order, the effect of dividing a decimal by ten or a power of ten is to move the decimal point to the left as many places as there are ciphers in the divisor; e.g.,

$$.0625 \div 10 = .00625$$
$$625. \div 1{,}000 = .625$$
$$6.25 \div 100 = .0625$$

Problems

1. $128.36 \div 1.2 = ?$
2. $128.463 \div 2.42 = ?$
3. $.036 \div .00012 = ?$
4. $36 \div .012 = ?$
5. $.0036 \div 12 = ?$
6. $12{,}846.29 \div .628 = ?$
7. $56{,}210.47 \div .583 = ?$
8. $159{,}281.67 \div .618 = ?$
9. $56{,}882.75 \div .631 = ?$
10. $247{,}680.22 \div 59.21 = ?$

Converting Common Fractions into Decimals

Rule. Any common fraction can be converted into a decimal fraction, without changing its value, by dividing its numerator by its denominator; e.g.,

$$4/5 = \begin{array}{r} 5\overline{)4.0} \\ .8 \end{array}$$

$$1/3 = \begin{array}{r} 3\overline{)1.00} \\ .33\ 1/3 \end{array}$$

Problems

Express the following common fractions as decimals, carrying the decimal out to two places and preserving the fraction:

1. 15/17; 2. 26/24; 3. 115/285;
4. 68/91; 5. 43/116.

Converting Decimals into Common Fractions

Rule. Any decimal fraction can be converted into a common fraction, without changing its value, by the following process. Multiply the decimal by ten or that power of ten which will remove its decimal point and make it a whole number. Write this whole number as the numerator over ten or that power of ten which has just been used as a multiplier; e.g.,

$$.625 \times 1{,}000 = 625; \qquad .625 = \frac{625}{1{,}000}$$

$$6.25 = 6\,\frac{25}{100} \qquad .0625 = \frac{625}{10{,}000}$$

$$8.3 = 8\,\frac{3}{10} \qquad .00097 = \frac{97}{100{,}000}$$

If the decimal contains a common fraction the process is essentially the same; e.g.,

$$.33\ 1/3 = \frac{33\ 1/3}{100} = \frac{\frac{100}{3}}{\frac{100}{1}} = \frac{100}{3} \div \frac{100}{1} = \frac{100}{3} \times \frac{1}{100} = \frac{1}{3.}$$

$$.12\tfrac{1}{2} = \frac{12\frac{1}{2}}{100} = \frac{\frac{25}{2}}{\frac{100}{1}} = \frac{25}{2} \div \frac{100}{1} = \frac{25}{2} \times \frac{1}{100} = \frac{1}{8.}$$

$$.08\ 1/3 = \frac{8\ 1/3}{100} = \frac{\frac{25}{3}}{\frac{100}{1}} = \frac{25}{3} \div \frac{100}{1} = \frac{25}{3} \times \frac{1}{100} = \frac{1}{12}$$

Per Cent. The expression means by the hundred. Any decimal fraction can be expressed as a percentage by using the symbol %, and moving the decimal point two places to the right; e.g., .625 = 62.5%; .0625 = 6.25%; .33 1/3 = 33 1/3%.

In reverse manner, the symbol may be removed without changing the value, if the decimal point is moved two places to the left; e.g., 8% = .08; 12 1/2% = .12 1/2; 12.5% = .125.

There are certain fractions whose common and decimal forms are so much used that their mutual equivalents may profitably be learned by rote. A list follows. Verify these equivalents.

1/2 = .5 = 50%
1/3 = .33 1/3 = 33 1/3%
2/3 = .66 2/3 = 66 2/3%
1/4 = .25 = 25%
3/4 = .75 = 75%
1/5 = .2 = 20%
2/5 = .4 = 40%
3/5 = .6 = 60%
1/6 = .16 2/3 = 16 2/3%
1/8 = .12 1/2 = 12 1/2%
5/6 = .83 1/3 = 83 1/3%
3/8 = .37 1/2 = 37 1/2%
5/8 = .62 1/2 = 62 1/2%
7/8 = .87 1/2 = 87 1/2%
1/15 = .06 2/3 = 6 2/3%
1/20 = .05 = 5%

Problems

Change decimals to common fractions, or the reverse, whenever converting makes the solution simpler.

1. 8735 × .50
2. 3940 × .33 1/3
3. 267 × .16 2/3
4. 379.3 × .16 2/3
5. 842 × .20
6. 3824 × .14 2/7
7. 5316 × .12 1/2
8. 4026 × .08 1/3
9. 1488 × .06 1/4
10. 1940 × .37 1/2
11. What is the cost of 35 yards of batiste at 62½c a yard?
12. Figure the cost of 24 yards of cambric at 12½c a yard.
13. Figure the cost of 48 yards of theatrical gauze at 37½c a yard.
14. What is the cost of 5½ yards of velvet at $8.95 a yard?
15. What is the cost of 5⅝ yards of crepe at $4.95 a yard?

Write each of the following as a common fraction and as a decimal without the per cent symbol:

16. 7%
17. 2 1/3%
18. 4%
19. 19%
20. 24%
21. 16 2/3%
22. 37 1/2%
23. 1/10%
24. 1/4%
25. .5%
26. 20%
27. 83 1/3%
28. 5 1/6%
29. 62 1/2%

30. 14 2/7%
31. 11 1/9%
32. 87 1/2%
33. 88 8/9%
34. 15 1/5%
35. 9 1/11%

Write each of the following as a per cent, using the per cent symbol:

36. .74
37. .532
38. 3.2
39. 69.3
40. .593
41. 43.6
42. .10
43. .126
44. 10.0
45. 2.
46. .87 1/2
47. .33 1/2
48. .003
49. 30.03
50. 1/5
51. 3/7
52. 5/6
53. .385
54. 6/8
55. 2/3

56. In a silk department the buyer noticed that many salespeople allowed the customers several inches over the billed amount. For one day he had all yardage measured for one salesperson. How much money did the department lose in one day from the incorrect measuring on the part of this salesperson?

Customer Ordered	Salesperson Cut	Price per Yard
2 1/3 yds. radium	2 yds. 14″	$2.95
1 1/8 yds. velvet	1 yd. 5 1/2″	8.50
4 3/4 yds. moire	4 5/6 yds.	4.85
6 3/8 yds. chiffon velvet	6 4/9 yds.	5.85
3 1/8 yds.moire	3 1″6 yds.	4.85
3 5/6 yds. crepe	3 yds. 33″	4.85
5 yds. metal crepe	5 1/12 yds.	8.65
6 4/5 yds. flat crepe	6 5/6 yds.	3.45
7 3/8 yds. salome velvet	7 5/12 yds.	9.85
4 yds. bengaline	4 1/15 yds.	3.25
6 3/4 yds. ting-a-ling	6 5/6 yds.	3.95

Finding Percentage. The percentage of one number to another can always be found by dividing that number by the other. Thus, the percentage of 1 to 2 is found by dividing 1 by 2. The division can also be expressed by writing 1 as the numerator, and 2 as the denominator of a fraction; 1 is ½ of 2, or 50% of 2. Solve orally.

What per cent of 8 is 4?
" " " " 8 " 2?
" " " " 24 " 3?
" " " " 12 " 18?
" " " " 25 " 5?

What per cent of 9 is 3?
" " " " 25 " 20?
" " " " 15 " 30?
" " " " 10 " 8?
" " " " 30 " 20?

Decimals Used to Compute Selling Cost

The Selling Cost of a salesperson is the percentage of her salary to her net sales.

$$\text{Formula: } \frac{\text{Salary}}{\text{Net Sales}} = \text{Selling Cost per cent}$$

$$\frac{\$15\ \text{Salary}}{\$300\ \text{Net Sales}} = .05 = 5\%\ \text{Selling Cost}$$

This means that 5c of every dollar which the store receives from her sales, goes to pay her salary.

Problems

Salespeople in the underwear department had the following net sales and salaries. What was the selling cost of each?

	Salary	Net Sales
1.	$15.00	$365.00
2.	16.50	415.36
3.	18.00	360.59
4.	22.50	565.60
5.	14.50	275.45
6.	20.00	436.75
7.	18.00	376.54

8. What was the department selling cost?

Decimals Used to Compute Quotas

A Quota is the amount in dollars that a salesperson must sell to earn a certain salary. It is determined arithmetically by dividing salary by a stipulated selling cost per cent.

$$\text{Formula: } \frac{\text{Salary}}{\text{Selling Cost \%}} = \text{Quota}$$

$$\frac{\$16 \text{ Salary}}{4\% \text{ Selling Cost}} = \frac{\$16}{.04} = \$400 \text{ Quota}$$

The selling cost per cent as thus used to determine quota, is a per cent which the store has determined from past experience. Statistics from many stores may show, for instance, that a certain department if operated efficiently should not spend more than 4 cents of each dollar on salaries. Having arrived at this percentage, it is possible to determine by the formula given above what a salesperson's net sales must be in any given period in order to earn a certain salary.

Problems

Compute the quotas for the glove department which has a selling cost of 6.9%.

1. Salary $18.50
2. " 20.50
3. " 19.00
4. " 18.00
5. " 20.00
6. " 22.50
7. " 21.50
8. " 17.50

Decimals Used to Compute Commissions

If a salesperson is paid a commission on the basis of a certain percentage of sales in excess of a quota, the commission may be computed by multiplying that excess by the percentage agreed upon.

Compute commissions on the following:

	Quota	Net Sales	Commission Rate
	$465.	$595.	2%
2.	139.	169.	3½%
3.	269.75	278.85	3½%
4.	500.	550.	3%
5.	480.	600.	2%

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